Chapter 2
Maritime Archeology of Tourism in Yellowstone National Park

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This chapter reports on an investigation of Yellowstone National Park's unique maritime heritage and focuses on material remains of the park's 19th- and early-20th-century tourist infrastructure in Yellowstone Lake. These sites were examined within the overall framework of the historical archeology of tourism developed by Hunt (1994c; Chapter 1 of this volume), but they represent distinctive examples of an underwater cultural heritage not previously investigated in the park. Like their counterparts on land, these sites are linked to the broader context of Yellowstone National Park's status as one of the premier tourist destinations in the American West.

Maritime tourist infrastructure development on Yellowstone Lake did not occur in a cultural vacuum. Though isolated spatially, tourist development in late-19th-century Yellowstone National Park was directly linked to the larger capitalist world-system and to the social and economic processes taking place elsewhere in the nation. The creation and successful marketing of Yellowstone was tied to two simultaneous mid-19th-century phenomena. First, industrial expansion and the westward push by railroads opened up previously inaccessible areas to outside visitation. Second, the same industrial expansion created demand for mass tourism and new recreational opportunities, along with the requisite support infrastructure.

The research perspective used in this study links maritime archeological sites in Yellowstone Lake to the larger tourist system that developed in Yellowstone National Park after its creation in 1872 (see Hunt, Chapter 1 of this volume), as well as to the broader economic context in which the park was created. Underwater sites investigated in this chapter are interconnected in what we term the "Yellowstone Lake Maritime System" (Russell et al. 2004). We use the concept of a maritime system to demonstrate that to truly understand the unique nature of these maritime sites, they must be interpreted in a broad context, not in isolation. Traditional maritime systems that represent global interconnections inform on more typical aspects of the capitalist world-system, such as core/periphery production, supply

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relationships, and trade patterns (Wallerstein 1974, 1980, 1989). The Yellowstone maritime system is more tightly focused to illuminate post-industrial tourism as a by-product of capitalism. The Yellowstone maritime system did not involve shipment of market goods, the primary function of most maritime systems. Instead, its development catered solely to an emerging tourist trade backed and marketed by the Northern Pacific Railroad. In this regard, like other historical archeological sites in Yellowstone National Park, underwater archeological sites in Yellowstone Lake can be interpreted within the overall context of tourism (Hunt 1994c, Chapter 1 of this volume; Corbin et al. 2003) and, more widely, as a component of the capitalist world-system (Russell et al. 2004).

Tourism has a long academic history as a subject of anthropological inquiry (Smith 1978; Nash 1981; Graburn 1983; Crick 1989), but has only relatively recently become the subject of archeological study (Hunt 1994c; Corbin et al. 2003; Russell et al. 2004). Tourism is a complex worldwide process that perhaps represents the largest non-military movement of human populations (Greenwood 1972:82) and is responsible for extensive cultural contact and social change. Tourism is unique in transportation in that the consumers themselves travel to collect experiences rather than goods being transported for consumption (Crick 1989:334), which necessitates development of extensive infrastructure able to move and support people in sometimes very isolated areas. In this study, tourism is utilized as a historical context through which a local maritime system is examined.

It is surprising to most that one of the largest water bodies in National Park Service (NPS) jurisdiction is in Wyoming, within Yellowstone National Park. Those most familiar with parks on the Atlantic, Pacific, and Gulf of Mexico coasts are often astonished to learn that Yellowstone Lake encompasses a water surface rivaling Biscayne National Park and larger than that of Dry Tortugas National Park. Yellowstone Lake is not just large – it is deep. Average Yellowstone Lake depths exceed most other NPS areas, with the possible exception of Lake Superior's Isle Royale National Park and California's Crater Lake.

Yellowstone Lake, with more than 100 square miles of surface area (160 km^2), dwarfs the other 75 ponds and lakes in Yellowstone National Park (Fig. 2.1). Centuries before the idea of the world's first national park was discussed around a frontier campfire, Yellowstone Lake was the focus of much human activity. Native American groups had long been moving through the area, hunting and living along the shores of this high-altitude, volcanic lake. How many indigenous sites occur along the lake shores is unknown, but evidence indicates a long history of human occupation and use of the unusual area associated with Yellowstone Lake.

The earliest European American activities in the area mirrored those of Native Americans. However, these activities shifted toward scientific studies by the 1870s and, before the end of the century, included recreation, with heavy influence from concessionaires catering to the growing tourist trade. The period 1860–1890 was one of sweeping changes in American society that included widespread settlement of the American West and a major change in the nation's economic focus from agriculture to industry. Westward industrial expansion, led by mammoth railroad monopolies, had a curious and unexpected by-product: creation of many of the

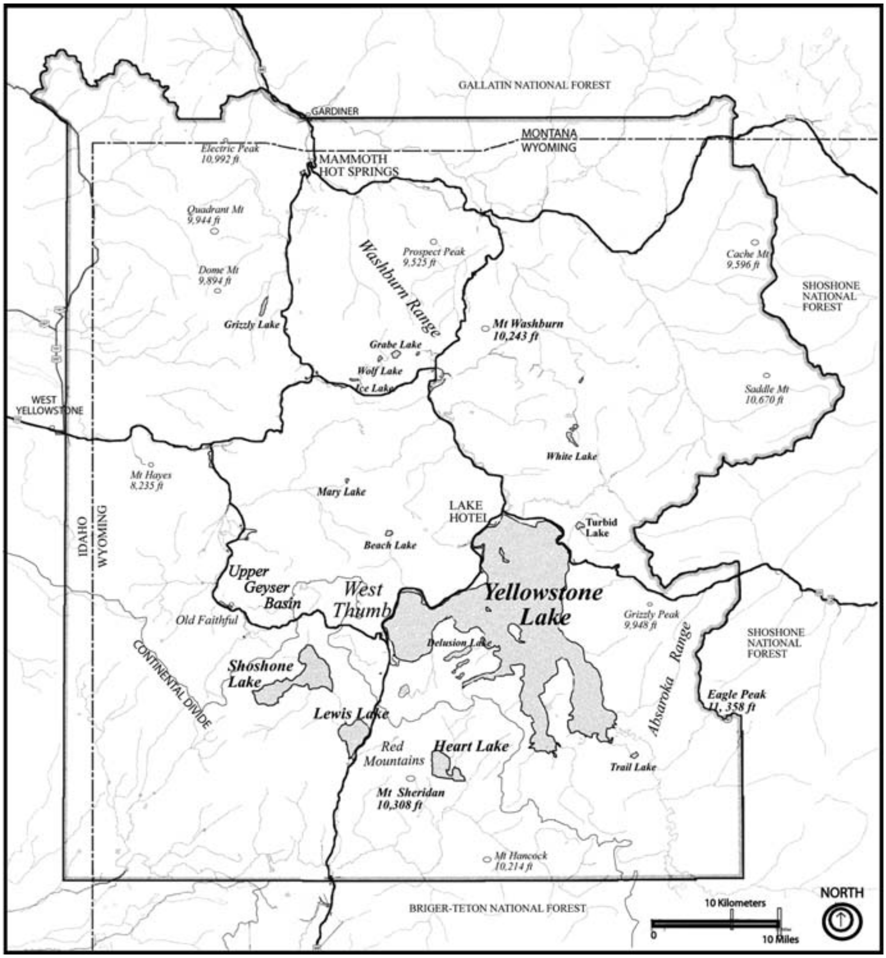

Fig. 2.1 Yellowstone National Park

nation's largest and most spectacular national parks and the promotion of tourism. After being designated as the world's first national park in 1872, thanks largely to the influence of the Northern Pacific Railroad, Yellowstone National Park became a popular turn-of-the-century tourist destination. To facilitate and stimulate visitor access, the Northern Pacific backed development of an extensive tourist infrastructure, including hotels, roads, and a vast transportation network. In response to increasing numbers of tourists, a unique maritime system developed on Yellowstone Lake, including passenger steamers, docking and marine railway facilities, a rental boat fleet – all of which culminated with tour vessel *E. C. Waters*' launch in 1905. This 38-m (125-ft) wooden-hulled screw steamer was the largest ever to operate on Yellowstone Lake.

European American sites, many related to the maritime system and integral to the park's history, are numerous around Yellowstone Lake, although the number and full range of these sites is still under investigation. Park management recognized the importance of these archeological sites and began a program to methodically survey, inventory, and evaluate them for their management, protection, and interpretation. Terrestrial archeological surveys and excavations were conducted in many park areas, including some portions of the Yellowstone Lake shoreline.

The investigation of maritime sites related to Yellowstone's tourist infrastructure began as a result of discussions between the NPS Submerged Resources Center (SRC) and park management in 1995 during an archeological reconnaissance (Lenihan 1995a, 1995b). This led to SRC being asked to provide technical information on Yellowstone Lake physiography for natural resource issues in 1996. Yellowstone scientists became aware of SRC's systematic remote sensing of natural resources in other park areas, particularly Biscayne and Dry Tortugas National Parks. An important question facing Yellowstone natural resource scientists was how to control proliferation of exotic lake trout that compete with native trout in Yellowstone Lake. Fisheries biologists wished to determine whether methods developed by SRC for seabed classification would be appropriate for classifying lakebed sediments in order to understand their relationship to lake trout breeding. Having demonstrated the cost-effective benefits of multi-resource investigations, SRC accepted the opportunity afforded by this natural resource investigation to collect information on submerged cultural resources at the same time. Effective submerged cultural resources investigation and management requires consideration and incorporation of natural resources in a multidisciplinary approach. Natural resource investigation is core to all SRC research, whether to characterize archeological site formation processes or for environmental context. This combined natural and cultural resources approach, which utilizes a single team and mobilization, again proved effective and cost-efficient during this project (Bradford et al. 2003).

The project's cultural resource component was designed to accomplish two goals. First, to investigate selected shoreline archeological sites and submerged near-shore features related to the history of Yellowstone Lake, including pre-contact and post-contact Native American sites, and historical European American features such as boat docks, watercraft remains and other material culture scatters. Second, to conduct side scan sonar survey to locate submerged watercraft remains, including small boats near the old Lake Hotel dock and *Zillah*, the first large lake tour boat, reported to have been sunk near the lake's northern end. Although park divers have observed submerged near-shore features near the Lake Hotel and West Thumb Geyser Basin, no systematic archeological survey of these areas were previously conducted.

The investigation of Yellowstone Lake's maritime tourism was originally designed to acquire substantial information on lake submerged archeological sites selected by park managers. During the survey, SRC researchers were greeted by geological features unique to Yellowstone and by remarkable vestiges of human occupation that stretch from prehistory through the stagecoach era to steam-powered tour boats. Underwater, researchers observed hot springs emerging in the lake and, with side scan sonar, strange mineral formations resembling volcano cones and tall, thin

spires rising high from the lakebed. The long procession of human visitors to this extraordinary landscape is well represented by material remains in and around the lake. The archeological team recorded many submerged structures and small boats in addition to the primary target for documentation, *E. C. Waters*. These archeological features are material evidence of adaptations developed to meet the challenges of navigating this large, isolated, high mountain lake and material remains of America's diverse and long-standing involvement with this park. The body of water upon which watercrafts operate influences their design, and our team is among the few to have the opportunity to investigate Western mountain lake vessels.

Our broader research questions focused on how the "Yellowstone Lake Maritime System" fits into the larger, interconnected system of the late-19th-century Western tourism and industrial capitalist expansion, and how the material record reflects the differences and similarities of the Yellowstone maritime system when compared to other contemporary maritime systems, such as on the Great Lakes. We believed the archeological record should reflect similarities with other regions because of the system's link to the larger process of industrial development and its connection in a world-system, but also expected differences to be present because of the unique environmental setting (a high-mountain lake not connected to other navigable waterways) and the nature of the trade (which did not involve shipping goods, but existed solely to support tourism) (Russell et al. 2004).

This chapter begins by developing a specific historical context for Yellowstone Lake, highlighting the role tourism played in creating the structures and vessel remains present in the lake today, as well as how they were connected to the outside world. We then briefly discuss previous archeological work around Yellowstone Lake, which served as a baseline for the survey reported here. The chapter then outlines the idea of a maritime system as a subset of the larger tourist system at work in Yellowstone National Park and as a framework for interpreting maritime archeological remains found in Yellowstone Lake. This is followed by a detailed discussion of the archeological sites we recorded in the lake. Finally, we conclude with a variety of recommendations for future research.

Yellowstone Lake and Tourism: Historical Context

Between 1860 and 1890, rapid westward expansion and settlement occurred in response to the search for minerals. With the discovery of gold and silver in the Rocky Mountains, prospectors and miners led an influx of settlers into the region more quickly than expected from exploitation of other resources. Mining quickly became the focal point for regional settlement, and as communities grew up around mining locations, trade and agriculture concentrated on supplying mining settlements. This development process led to demand for improved transportation systems, including rail, coach, and steamboat. Widespread late-19th-century Western settlement fueled the United States' national economic development through expansion of the resource base, increasing markets for eastern manufactured goods,

impelling improvements in transportation, and encouraging foreign investment in mining, ranching, and railroads (Fite and Reese 1965:315,318). Westward settlement, largely an eastward flow of people from the West Coast, was so complete that it prompted the often-cited 1890 declaration by the Census Bureau that a "frontier" no longer existed in the United States (Paul 1963:viii). In general, the period 1860–1890 witnessed a transition from western agriculture to eastern industry as the dominant economic factor in the United States. After 1890, the economic importance of Western settlement and agriculture rapidly declined as industry ascended (Fite and Reese 1965:296).

Partly in response to increased demand from the West, and fueled by increased industrialization in the East, the railroad monopolies pushed westward, opening up huge western land tracts to increased settlement and visitation. Between 1865 and 1920, total railroad mileage in the United States increased from 37,000 to 253,000 miles (60 000/407 000 km), and rail passengers increased 400% between 1882 and 1920 (Fite and Reese 1965:324,326). Expansion of the nation's rail network coincided with and capitalized on creation of a tourist class in search of new and interesting destinations. As a result, Yellowstone National Park was a focal point for Western tourism; within the park, Yellowstone Lake became a popular tourist destination.

Yellowstone Lake occupies the central Yellowstone Plateau. By the time ancient humans arrived on the plateau, there were many lakes, ponds, and streams created by melting glacial ice. Yellowstone Lake was the region's largest, and its present size of 139 square miles (224 km^2) makes it the United States' largest natural, high-elevation lake (Whittlesey 1988:167–168). Yellowstone Lake, like most freshwater sources, was a focal point for human activity.

Yellowstone Lake's Ancient History

Archeological evidence from Yellowstone National Park reflects more than 10,000 years of human utilization, beginning at the end of the last ice age with seasonal occupation by highly mobile hunting bands possessing varied material culture. The scant material evidence indicates only rare and brief sojourns onto the plateau to hunt modern species and now-extinct Pleistocene herd animals such as mammoth, horse, and giant bison and to gather supplemental wild food plants.

Artifacts from Fishing Bridge peninsula on Yellowstone Lake's east shore indicate the lakeshores were probably used as early as 8,000 B.C.E. and certainly by about 7,000 B.C.E. (Reeve 1989; Cannon 1993:9). Sometime around 6,500 B.C.E., many Pleistocene megafauna species died off as the climate changed to a warmer, drier regime. Rainfall remained abundant in the mountains, and succeeding human occupations continued into Late Prehistoric times. The most intensive lake use was during either Middle to Late Archaic times (3,000–900 B.C.E.) or during the Late Prehistoric period (up to A.D.1500). Many precontact sites, some quite large, from

both periods have been located around Yellowstone Lake (Taylor et al. 1964; Reeve 1989; Cannon 1993).

Yellowstone's indigenous human occupation is often referred to as limited or transient, but the archeological evidence indicates a long history of Native American use. This archeological evidence supports Native American origin stories and ethnohistorical accounts from several tribes that describe the Yellowstone Lake region as their ancestral homeland or place of origin. Groups claiming ties to Yellowstone Lake include the Kiowa (Mooney 1979), Shoshone (Dominick 1964; Wright 1978), and Apache groups (Perry 1980), particularly the Kiowa-Apache (Gunnerson and Gunnerson 1971:14).

By the late 1600s, introduction of the modern horse into the northern plains drastically changed subsistence patterns of indigenous cultures. Pedestrian bands became more mobile and much faster with the horse, so groups hunted plains bison more and used the mountains less (Haines 1996a:8). By the time European Americans first penetrated the Yellowstone Plateau in the early 1800s, the plateau was largely abandoned except for occasional trips through the area by the Shoshone, Piegan (Blackfeet), Crow and Bannocks, and the more distant Flatheads and Nez Perce to the north and west along established trails. Indigenous groups used a variety of trails through Yellowstone, many of which were ancient and much-traveled, although most had fallen into infrequent use (Chittenden 1924:7–9). The Great Bannock Trail through the park's northern section was the major east–west thoroughfare with other trails forming minor connecting routes in other directions. Yellowstone Lake appears to have been a major landmark in north–south travel, and sites associated with these movements are likely present along its shores.

One exception to general plateau abandonment was a Native American group referred to as the "Sheepeaters," described as Shoshonis who had ". . .retained the old way of living from the time before horses were introduced and who established a specialized mountain culture" (Haines 1996a:24). The first recorded European American observation of Sheepeaters is from 1835 when a party of Lamar Valley trappers led by Osborne Russell encountered them (Haines 1996a:49). Early European American explorer accounts of the region suggest that most Indian groups, including Sheepeaters, were generally unfamiliar with the area beyond specific areas they frequented. Apparently, they were unaware of the main geyser basins' thermal features (Chittenden 1924:9–12). Sheepeater diet included fish, which indicates they probably utilized, and perhaps seasonally occupied, Yellowstone Lake shores. European American encounters occurred until the Sheepeaters were dispossessed of their lands in 1851. Their lands were ceded by treaty with the United States to the Piegan and Crow, who, in turn, lost them in an 1868 treaty (Hodge 1910:378; Haines 1996a:27).

Archeological evidence of Yellowstone Lake fishing is scant, although some has been observed. A submerged feature just offshore an occupation site northeast of Bridge Bay has been suggested as a fish weir (Johnson and Lippencott 1989:41; John Lounsbury, 1996, personal communication). Net-weight sinkers were found in archeological sites south of the lake and along the Yellowstone River. Fish bones were recovered from a roasting pit at site 24YE3 (Ann Johnson, 1997, personal

communication). There is only a single mention of Indian watercraft in the ethnohistorical literature – an entry by Norris (1880:37) who "...saw a rude canoe at the lower rapids of the Upper Yellowstone, and probably others have been used by both Indians and white men...."

Yellowstone Lake's Historic Period

It is generally agreed that John Colter, a member of the 1803–1806 Lewis and Clark expedition, was the first European American to view Yellowstone Lake. In his 500-mile (805-km) solo trek through the Northern Rockies in the winter of 1807–1808, Colter walked along the lake's west side during his return to the Bighorn River (Haines 1996a:35–38). In 1827, trapper Daniel Potts described Yellowstone Lake as "...a large fresh water Lake ... on the very top of the Mountain ... and as clear as crystal..." (Haines 1996a:41). Many trapping parties probably camped by the lake after 1826 and Osborne Russell made five trips into the Yellowstone country between 1835 and 1839. Although Yellowstone Lake was the original objective of his 1835 trip, (its location had been drawn for him by a Sheepeater on a hide map), he instead trapped in the surrounding mountains (Haines 1996a:48). Russell returned in summer 1836 trapping in the lake's marshy south shore area where the Yellowstone River enters. From there, he traveled up the lake's east side to Pelican Creek exiting the region to the north at summer's end (Haines 1996a:50). Russell returned to the area twice in 1839. During the second trip while camping at Pelican Creek, Piegan Indians attacked his party, and he escaped along Yellowstone Lake's west shore to the Snake River (Haines 1996a:51–52). Also in 1839, Indians attacked a group of 40 trappers traveling the lake's east shore near Mary Bay just south of Pelican Creek (Haines 1996a:52). Trappers were only interested in beaver; their association with Yellowstone Lake was trapping where the Yellowstone River connects and using established shore trails. Warren Angus Ferris, an American Fur Company clerk, was probably the first "tourist" to visit Yellowstone. Ferris traveled to Yellowstone specifically to see the geological wonders, rather than for solely commercial reasons (Haines 1996a:46–47).

For the next 20 years, few European Americans visited Yellowstone territory, but gold strikes in the early 1860s brought an incursion of miners to the Idaho-Montana region. By the end of this period, miners had explored most parts of the future park, and many undoubtedly saw Yellowstone Lake. At least nine mining expeditions entered park territory between 1863 and 1870. The 1864 Phelps-Davis party skirted the lake's eastern edge, and, in 1866, George Huston mentioned a "horse-thief trail" along the west side of Yellowstone Lake (Haines 1996a:75). Both mining groups and horse thieves were apparently taking advantage of earlier Indian and trapper trails through the area. Like the trappers, miners' interest was commercial, and their association with the lake was incidental. Before 1869, when the first expedition was organized to specifically inspect and record Yellowstone's unique natural fea-

tures, Yellowstone Lake's importance was likely limited to providing fish for Native Americans, trappers, and miners.

The 1870s was a decade of scientific study for Yellowstone. Although visitors to the area continued to mention Yellowstone Lake's productive fishing, it is during this period that direct use of Yellowstone Lake for transportation is first mentioned.

Yellowstone Lake's Early Watercraft

The First Rafts

The first recorded Yellowstone Lake watercraft was a small raft built in September 1870, by the Washburn expedition. The builders assumed lake islands had "...doubtless ... never been trodden by human footsteps" (*Helena Herald* November 9, 1870). In a single sentence of his 1870 official report, Washburn expedition member Lt. G. C. Doane noted the raft's fate and characterized Yellowstone Lake navigation: "We built a raft for the purpose of attempting to visit them [the islands], but the strong waves of the lake dashed it to pieces in an hour" (Cramton 1932:130). Fellow expedition member C. Hedges provided more detail:

> The wonderful beauty of the lake had wrought a charm over almost the entire party, and around the evening camp fire we voted to traverse the entire lake shore.... We would build a raft, raise a blanket sail, and visit the wooded islands; we would visit every nook and corner.... Our attempt at raft building was such an utter and ignominious failure that the subject was dropped by mutual consent. The wind was always from the wrong direction, the waves rolled unnecessarily high, the water was evidently deep and unmistakably cold, the islands distant, and the logs altogether too much inclined to slip their cables and strike out in their individual capacity. The toil of a day was the wreck of a few moments, and we hushed our disgust with the glad reflection that we had never got away on it, and quit the subject by promising ourselves to bring an India-rubber boat when we came again (*Helena Herald,* November 9, 1870; see also Cramton 1932:108–109).

The combined Hayden/Barlow-Heap expedition rafted the Yellowstone River near Mud Volcano in July 1871. On July 30, Captain Barlow built another raft to cross the Yellowstone River lake outlet, and with it explored east of the river to Pelican Creek (Haines 1996a:146, 148). In 1873, a Corps of Engineers raft was launched on the Yellowstone River at its lake outlet, although the two Corps members had only slightly more success than their predecessors. Near the river outlet the two topographers, Paul LeHardy and Gabbet began a river trip that ended with their raft wrecked in the rapids (Haines 1996a:201). The men survived, and LeHardy Rapids gained its name. Whittlesey (1988:167) mentions that in 1874, US Government surveyors constructed a raft to conduct their business around the lake, but no other information is offered.

Early Boats

The first successful lake navigation in a boat occurred during the 1871 Hayden expedition. Hayden's group brought a collapsible, canvas-and-wood-frame sailboat for

Fig. 2.2 The canvas-and-frame boat *Anna*, the first boat on Yellowstone Lake, 1871 (W. H. Jackson photograph 273). Haines (1996a:147) attributes the misspelled name to the photographer altering the negative

lake exploration (Fig. 2.2). The craft was named *Anna* in honor of Anna Dawes, an early and effective proponent of the national park. She was also daughter of H. D. Dawes of Massachusetts, then chairman of the House Committee on Appropriations, which helped fund the expedition, and sister to Henry Dawes, the expedition's general assistant. The 3.65-m (12-ft) boat was constructed from a wooden framework covered by tarred-canvas (Haines 1996a:148). It was primarily used for sounding Yellowstone Lake in 1871, and also used for exploring Shoshone Lake (Norris 1880:11, 37; Haines 1996a:148).

In 1874, E. S. Topping, 1872 Hayden Expedition member and one of the early park tour guides, along with Frank Williams, built a row boat and a small sail boat of green whipsawed timber at his cabin (later named Topping Point) near the foot of Yellowstone Lake (Topping 1968:123). The latter, a sloop-rigged yacht, is referred to as *Topping* by Whittlesey (1988:155) after its builder, but as *Sallie* by Topping (1968:124). It had a short life and, after "perilous service during a small portion of the seasons of 1875 and 1876, was dismantled, abandoned and finally lost" (Norris 1880:37; Whittlesey 1988:155). This was the earliest boat on the lake to provide some tourist services.

Lt. Doane, who led the military escort for the 1870 Washburn expedition, conducted a military reconnaissance of the park in the winter of 1876. One of Doane's enlisted men had operated Hayden's canvas boat *Anna* on Yellowstone Lake in 1871,

and his equipment for the 1876 reconnaissance included a small boat. The vessel was built in the post carpentry shop, dismantled and transported to the lake by mule, and reassembled with wood screws at the launch site. It was 6.70-m (22-ft) long, with a 117-cm (46-in.) beam and a 66-cm (26-in.) depth (Haines 1996a:210). When the party reached the Yellowstone Lake outlet, it took two days to assemble the boat. When ready, the party used the boat to transport supplies by towing it with a mule around the west shore. This worked well for about 24 km (15 mile), but "at Pumice Point, where it was necessary to cast off the line and row around the rocks, a large wave swamped the loaded boat, and it sank instantly. Everything was saved, but time was lost drying the cargo and repairing the damaged hull" (Haines 1996a:211). Three soldiers took the boat across West Thumb, but it was slow going against the wind, and the boat and men were coated with ice when they reunited with the others. They found the boat would not bear a cross-sea, and their only choice was to put the bow into the wind and row as hard as possible, bailing the boat each time a freezing wave caught them. The boat was transported overland to Heart Lake where it was used, again with great difficulty, to transport the group's supplies down the outlet stream to the Snake River, where it was eventually lost and the expedition abandoned (Haines 1996a:211–212).

In the summer of 1880, P. W. Norris, second superintendent of Yellowstone, had T. E. "Billy" Hofer and his brother construct a small sail boat, also of green, whipsawed lumber, measuring 6 m (20 ft) long × 1.8 m (6 ft) wide × 0.7 m (2.5 ft) deep, dubbed *Explorer*. Norris and his two companions, Captain Jack Davis and W. H. Parker, made a 10–12-day voyage in *Explorer* during which they circumnavigated Yellowstone Lake and most of its bays and fingers, and ascended Pelican Creek, the Upper Yellowstone and other streams to their rapids. These investigations did not result in any major discoveries, but they did confirm Stevenson's 1871 lake soundings. The boat, described as "loggy and clumsy," proved to be very unseaworthy and was maneuverable only with great effort. *Explorer* eventually wrecked near the point where it was built at Topping Point and was abandoned to the elements (Norris 1880:11–12).

There are brief accounts of at least two other boats on Yellowstone Lake in 1880. The first, built by T. E. Hofer for the tourist trade, did not succeed and it was reported that the boat later drifted over the Falls (Chittenden 1924:345). The second was another boat piloted by Hofer and William D. Pickett, which made at least one trip in 1880, although it was not reported for what purpose (Whittlesey 1988:167).

At least two government vessels operated on Yellowstone Lake in 1885. The first, a US Geological Survey (USGS) boat, was destroyed by lightening while making observations in northeastern Yellowstone Lake, with one fatality (Haynes 1946:104; Whittlesey 1988:167). This incident likely occurred during the Hague geological survey. The second government boat was the *US Pinafore*, a small craft tested on Swan Lake by Dan C. King of the US Army Corps of Engineers before being used on Yellowstone Lake (Whittlesey 1988:153). This boat, built by Road Foreman Lamartine, was the first Corps of Engineers vessel on Yellowstone Lake (Haines 1996b:408, n15). *US Pinafore* is not mentioned again in historical sources after its trial voyage that year (*Livingston Enterprise* August 22, 1885).

Another Corps of Engineer boat operated on Yellowstone Lake the following decade, in July 1891. It was noted at that time that "…the US Army Engineer Corps put on [the lake] a small boat which they use in supplying their road camps with forage and provisions and in hauling lumber from the mill to the various points where it is to be used" (Anderson 1891:7–8). In addition, Lt. Grayhill, in charge of park road construction in early 1891, hauled a 12-m (40-ft) steam launch to the lake to supply road crews working on the east end of the West Thumb-Lower Geyser Basin road (Haines 1996b:217).

Yellowstone and the Northern Pacific Railroad

Tourism, in the modern sense of the word, is a by-product of modern industrial society and the creation of leisure time and workers' paid vacations (Norris 1994:4). In anthropological terms, tourism can be defined as "leisure activity requiring travel," where leisure is freedom from primary obligations, such as work, study, and family and social responsibilities (Nash 1981:462). Tourism can also be considered "…that activity characterized by travel, conspicuous consumption, and pursuit of other than normal (secular) activities" (Hunt 1994c:26). A mid-19th-century "parks movement" in eastern cities can be attributed to generalized dissatisfaction with industrial culture and its effects on the landscape. This awakened interest in the beauty of the natural world, and toward the end of the 19th century, as "frontier" disappeared, "wilderness" and its preservation gained popularity (Norris 1994:5–6). The best examples of this new ethic are the 1864 federal grant to the State of California for preservation of Yosemite Valley, which achieved national park status in the 1890s; the 1872 designation of Yellowstone National Park, a milestone in wilderness preservation; and the romantic realism of Hudson River School artists such as Albert Bierstadt and Thomas Cole. Improved transportation was a key to developing protected western areas as tourist destinations, allowing tourism to merge with industrial expansion.

From the beginning, Yellowstone National Park was inextricably linked to the Northern Pacific Railroad, which began lobbying for park designation in 1870 and sponsored the Washburn–Doane Yellowstone Expedition that year to collect important information necessary for national park designation. Northern Pacific executives realized early that federal control of the land would be preferable to private control, allowing the railroad to directly profit from regional tourism by monopolizing access and tourist development. Railroad promoters recognized the potential profits tourism could bring, with scenery and unspoiled landscape as the principal market commodity. Northern Pacific lobbied heavily for passage of the Yellowstone Park Act, which was approved by the Congress on March 1, 1872. According to historian Richard W. Sellars, "…from the first, then, the national parks served corporate profit motives, the Northern Pacific having imposed continuous influence on the Yellowstone park proposal…" (Sellars 1997:9–10). The combination of federal protection and backing by private business interests ensured that tourism became an important and intrinsic part of the Western economy.

The Northern Pacific reached Livingston, Montana, 56 miles (90 km) from the northern park boundary, in 1883. From there tourists were transferred to stagecoaches for the last leg of the trip into the park, until a branch line was completed to the park in late 1883. Between 1883 and the early 20th century, the Northern Pacific built roads, hotels, and other visitor facilities in Yellowstone to accommodate burgeoning visitation. By 1910, the Northern Pacific had invested a million dollars in developing Yellowstone's tourist infrastructure and promoted its investments by marketing the route as its "Yellowstone Park Line" (Sellars 1997:20).

The Northern Pacific's charter forbade operation of subsidiary businesses, so it acted in Yellowstone National Park through independent companies. Though never directly owning any companies operating in Yellowstone, the Northern Pacific ensured tourist development was handled independently by men loyal to Northern Pacific interests and backed creation of a variety of companies, such as the Yellowstone Park Association (YPA), which operated hotels, constructed roads, and controlled transportation within the park (Haines 1996b:42–53).

The idea of launching a passenger boat on Yellowstone Lake to service the growing tourist trade was mentioned several times in the 1880s. As early as 1880, P. W. Norris observed that Yellowstone Lake, though very dangerous for sailing craft,

> . . .even a small steamer, well built and managed. . .would be [in] little danger attending regular trips around the fingers, thumb and palm of the lake. . . . [W]ith a suitable steamer making regular excursions. . . it is safe to predict that a hotel on some one of the many charming terraces near the foot of the lake would ultimately prove a profitable investment in this region of wonders (Norris 1880:12–13).

In 1889, park administration granted a permit to the Yellowstone Park Association for a naphtha launch on Yellowstone Lake, but the plan was never executed (Harris 1889:5). In the same year, the Yellowstone Park Association Board of Directors voted to put a steamboat, to be operated by Ella C. Waters, on the lake under the company's franchise (Haines 1996b:18).

The Steamer *Zillah*

Ella (or Eli) C. Waters is probably the name most closely associated with maritime activities on Yellowstone Lake. Born in 1849 in New York, Waters spent his early years in Fond du Lac, Wisconsin. When 14, he enlisted in the Union Army and received praise from his commanding officer for bravery in Civil War action. On July 26, 1865, he mustered out of service and began a series of endeavors that eventually led him to Yellowstone, including stints as a gold prospector, tea merchant, hotel operator, cattleman, and representative in the Montana Territorial Legislature. By the mid-1880s, after watching his fortunes rise and fall several times, he found himself in Yellowstone country. In 1887, he was appointed general manager of the Yellowstone Park Association (Yellowstone Park Company 1995).

In the summer of 1889, the Yellowstone Park Association acquired a steel-hulled, 40-ton steamer to provide tourist transportation on Yellowstone Lake (Figs. 2.3–2.6). The steamer *Zillah*, 25 m (81 ft) long with a 4.2-m (14-ft) beam, was

brought from Michigan to Yellowstone in segments (Haines 1996b:18–19). The vessel was originally launched on the Great Lakes in 1884, and had sunk in Lake Michigan, but was raised before its disassembly and trip west (Haines 1996b:401 n53). *Zillah* was working on Lake Minnetonka in eastern Minnesota when purchased by Charles Gibson, owner of Yellowstone Park Association (Bartlett 1989:190–191). During the winter of 1889–1890, a crew reassembled and fitted-out the vessel. The "Certificate of Inspection of the *Zillah*," from the firm of Douglas and Douglas dated September 5, 1906, notes the steamer was built in Dubuque, Iowa, in 1884, could carry up to 120 passengers, and had onboard six or seven officers and

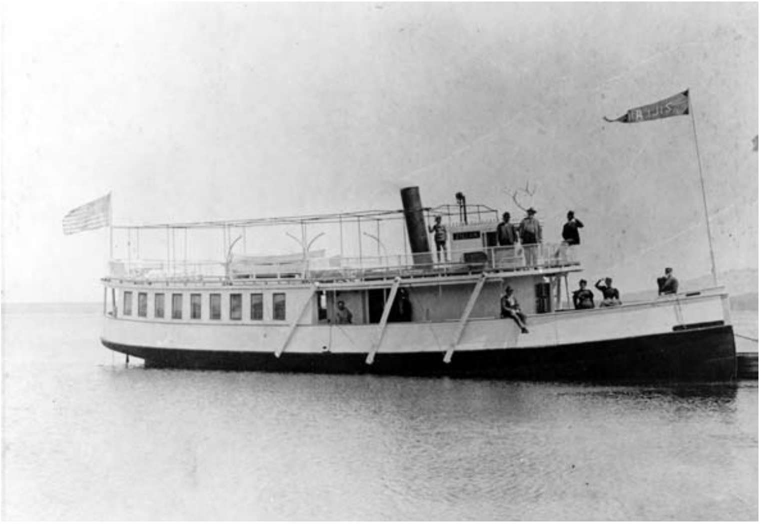

Fig. 2.3 *Zillah*, possibly at West Thumb, after 1889 (Yellowstone NP Archives)

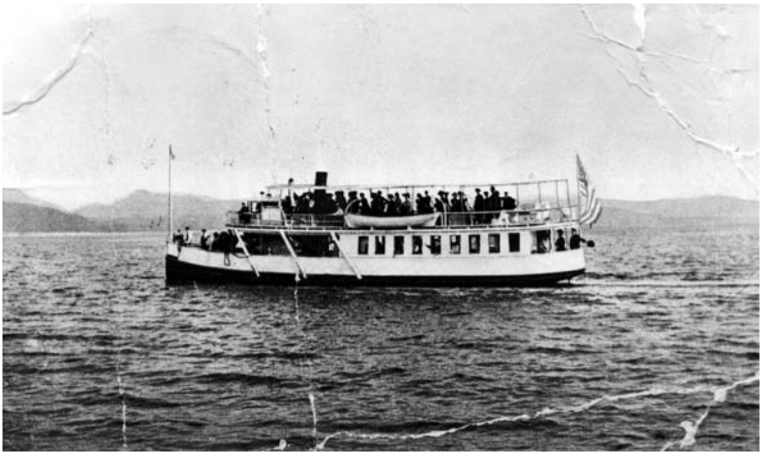

Fig. 2.4 *Zillah*, about 1896 (Yellowstone NP Archives)

Fig. 2.5 *Zillah* at Lake dock, 1896 (Yellowstone NP Archives)

Fig. 2.6 *Zillah* at Lake dock, 1896 (Yellowstone NP Archives)

crew (Bartlett 1989:207). Haines (1996b:18–19) suggests *Zillah* was on Yellowstone Lake by 1890, but the 1891 Superintendent's Report indicates the boat was actually licensed a year later:

> The proposition to put a small steamer on the lake for the accommodation of tourists has been agitated for a good many years, but was only recently accomplished. Early in July, an inspector came and gave the boat a license to carry 125 passengers. It is a smooth-running, seaworthy little vessel and will add much to the attractiveness of the lake as a resort. I hope to see it made a part of the Park transportation, and used in ferrying tourists from the Lake Hotel to the West Thumb in their journey around the circuit (Anderson 1891:7–8).

Captained by E. C. Waters, *Zillah* provided an alternative to the laborious stagecoach that brought tourists through the park to the Lake Hotel. Because Waters was not in business with the coach transportation companies, he charged an additional fee for lake transportation. Many tourists complained to the superintendent about Waters' extra fee. Despite this and other questionable acts, however, Waters received favorable comments in the park annual reports. For example, Acting Superintendent Anderson's 1892 report states:

> The steamer on the lake has been running successfully for a year or more, and adds much to the pleasure of a trip through the park. It is commodious and comfortable, and I believe perfectly safe. It is now made a part of the park transportation, and carries passengers, at their option, from the Thumb to the Lake Hotel, thus relieving them of 18 miles of tedious staging. I believe the boat company has enough small boats for the demands of fishing parties, but I think prices might be lowered where boats are used continuously for several hours (Anderson 1892:7).

Similarly, Anderson noted in his 1893 report that "[t]he steamer continues to be satisfactorily run, and is greatly enjoyed by all tourists who make the trip on it" (Anderson 1893:10). However, labor problems affected lake business in 1894. Because of close association between Yellowstone tourism and the railroad companies, the 1894 railroad strike resulted in losses to all park operations. Superintendent Anderson commented in his Annual Report:

> The boat company has suffered quite as much as other industries in the Park from lack of patronage. The boat has been put in excellent condition, and it furnishes one of the most delightful bits of travel on the tour. The proposition to put a few small steam or naphtha launches on the lake has not been carried out, but I believe it would prove remunerative and certainly would be a great accommodation to tourists (Anderson 1894:8).

By the following year, business returned to normal. E. C. Waters obtained a large percentage of the tourist travel and, as company general manager, he was granted a license to expand his business to include selling small groceries, providing blacksmithing to campers, and taking parties on small side trips, a niche not filled by larger concessionaires (Anderson 1895:10). He also expanded his business to include renting small boats and fishing tackle to tourists. In 1896, Waters placed bison and elk on Dot Island as an added attraction to *Zillah* customers, a move that contributed to his eventual undoing in the park.

Waters received permission to construct small landings at several points on the lake shore, including Dot Island and at his operations center near the Lake Hotel (Anderson 1896:10). Satisfactory reports of the boat operation continued through the remainder of the decade and into the early years of the 20th century. *Zillah*

was popular with tourists, and it carried 2,589 passengers during the 1897 season (Young 1897:6) and 3,050 in 1900 (Goode 1900:4). At the turn of the century, the strong Yellowstone Lake tourist business prompted acting superintendent Pitcher (1901:7) to suggest it would be desirable that "some competition be introduced in this business." The following year Pitcher (1902:12) suggested a larger boat, or several smaller ones, should be placed on the lake to accommodate increased tourist traffic.

Within a few years, E. C. Waters, likely in an effort to thwart competition, followed Pitcher's suggestion of a larger boat. In the meantime, however, the first few years of the new century continued to be successful for Waters. *Zillah* carried 3,826 passengers in 1904 (Pitcher 1904:10) and a record 5,275 passengers in 1907 (Young 1907:10). Despite these successes, Waters' Yellowstone Lake Boat Company fell into financial trouble, in part due to "his unscrupulous activities" (Haines 1996b:50). Because tourists' complaints continued about the "exorbitant" $3.00 charge for passage, Pitcher pushed his suggestion for increased competition in the lake excursion boat business, which may also have been fueled by *Zillah*'s deteriorating condition. As early as 1902, *Zillah*'s declining condition was commented upon by one traveler who, when seeing the moored vessel, said "[i]t was such an old rattletrap that I would not risk passage on it" (Bartlett 1989:192). E. C. Waters, in an apparent effort to shore up his operation, acquired a new larger vessel in 1905. By this time, *Zillah* had deteriorated beyond repair, and its tour boat career had ended. The vessel was either sold for scrap or scuttled sometime after 1920 (Yellowstone Park Company 1995:6).

The Steamer E. C. WATERS

Increasing tourist trade after the turn of the century and comments by park management suggesting competition prompted E. C. Waters to expand his tour boat operations. As president of the Tacoma-based Pacific Launch Company, Waters brought plans and materials for a 43 m (140 ft) × 9 m (30 ft) wooden-hulled steamship to Yellowstone Lake in 1904 (Yellowstone Park Company 1995:6). The new vessel was constructed and launched on the marine railway at the Lake docks boathouse in 1905 at a total cost of $60,000 (Yellowstone Park Company 1995:7). The new steamer, larger than *Zillah*, was christened *E. C. Waters* after its owner and captain, and was expected to carry Waters' business into the next decade.

E. C. Waters was 38 m (125 ft) in length and 8 m (26 ft) in beam and was the largest Yellowstone Lake passenger steamer; it was designed to carry 500 passengers (Haines 1996b:127) (Fig. 2.7). After launching the vessel, Waters requested a permit to carry the full complement of passengers, but park administration refused it. Because of difficulties with the park, Waters never made more than test runs with his new steamer (Whittlesey 1988:167). He refused to agree to a permit to carry fewer than 500 passengers, so the new steamer sat idle at its Stevenson Island anchorage (Haines 1996b:127).

Because of disagreements with park administration over the 500-passenger *E. C. Waters* permit and other problems he created through the years, Waters was asked to leave the park in 1907 (Haines 1996b:77). After Waters left the park, the T. E.

Fig. 2.7 Postcard photograph of *E. C. Waters* at Lake dock, about 1905 (Yellowstone NP Archives photo no. 14871)

Hofer Boat Company was given a permit to operate Yellowstone Lake concessions, and they bought Waters' park assets in 1910. T. E. Hofer Boat Company was reorganized into the Yellowstone Park Boat Company in 1911 with Harry Child as director (Bartlett 1989:193). *E. C. Waters* remained secured in a cove on Stevenson Island's east side, where it was thought to be safe from winter ice. During a strong easterly wind in 1921, however, the ice pushed the steamer onto the beach, where it still remains (Haines 1996b:415 n67).

The shipwreck was the subject of salvage operations in 1926, when the engine and boiler were recovered (Haines 1996b:415 n67). After removal of *E. C. Waters'* machinery, the Scotch marine boiler was used to heat the Lake Hotel for 46 years (Aubrey Haines, 1996, personal communication). The boiler was converted from wood to oil in 1937 and later coated with asbestos insulation (Dittl and Mallman 1987:19). In 1972, it was sold as scrap to a junkyard near Three Forks, Montana (Aubrey Haines, 1996, personal communication). Original steam gauges from *E. C. Waters* are reportedly still in use in the hotel heating system (John Lounsbury 1996, personal communication). There is no record of what became of the vessel's engine. The steamer's anchor was taken to the Bridge Bay marina, where it serves as a signpost (Fig. 2.8).

After the machinery was removed from *E. C. Waters*, the vessel quickly began to deteriorate. It served various informal purposes over the years: as a winter shelter for cross-country skiers, a "prop Jack Croney's fish-fry business," and a "retreat for brawls fueled with moonshine" (Haines 1996b:316). After years as an eyesore, however, park rangers eventually took it upon themselves to clean it up. In the spring of 1930, a small group of rangers skied across the lake to Stevenson Island and

Fig. 2.8 *E. C. Waters*' anchor at Lake dock in 1961 (photo by A. L. Haines, Yellowstone NP Archives)

burned the ship to waterline (Haines 1996b:316). Today, only *E. C. Waters*' hull bottom remains.

1910–1950

After the Yellowstone Park Boat Company (formerly Hofer Boat Company) transition from E. C. Waters' Yellowstone Lake Boat Company, little information is available about the lake tour business. Visitation apparently remained fairly constant, as records show from 1912–1915 passengers ranged from 3,305 to 4,277 per season (Brett 1912:7, 1913:4, 1914:6, 1915:6), similar to E. C. Waters' business during the late 1890s. The new company operated a small steamer called *Jean D* (Figs. 2.9–2.12), a boat similar to *Zillah*, although fishing boat rentals (Figs. 2.13 and 2.14) and tackles sales were more profitable (Bartlett 1989:193).

Fig. 2.9 *Jean D*, about 1910 (Yellowstone NP Archives photo no. 36373-3)

Fig. 2.10 *Jean D*, about 1912 (Yellowstone NP Archives photo no. 36362)

Fig. 2.11 *Jean D*, about 1910 (Yellowstone NP Archives photo no. 36373-3)

Fig. 2.12 *Jean D* (*left*) and *Zillah* (*right*) on shore at Lake, about 1922 (Yellowstone NP Archives photo no. 36372-1)

Fig. 2.13 Rental boats at Lake (Yellowstone NP Archives photo no. 18771)

Fig. 2.14 Passenger launch at Lake in September 1934 (Yellowstone NP Archives photo no. 29091/12120)

In 1916, passenger numbers dropped to 2,558 (Yellowstone National Park 1916:3). A prophetic note in the superintendent's 1917 Annual Report provides a clue for Yellowstone Lake passenger decline – touring cars had supplanted the old stagecoach for park travel (Yellowstone National Park 1917:6). More visitors were using their own car to visit the park. Auto camping became especially popular after World War I, as indicated by a comment in the superintendent's 1918 Annual Report:

> The Yellowstone Park Boat Co. rendered little service to the public this season. This company has very little useful boat equipment. Its big boats are in poor condition and will not meet present demands on service on the lake, and its small boats, except two (14 m) 45-foot gasoline boats and a few launches, are old, dilapidated, and unsafe. This company has not furnished satisfactory equipment for the boat service since 1916 (Yellowstone National Park 1918:81).

Park archival photographs depict several small watercrafts operating on Yellowstone Lake during 1910–1930 (Figs. 2.15 and 2.16), but no supplemental information was found during this project's limited search in these archives. The photographs include: a US Fish and Wildlife Service boat (Fig. 2.17) from around 1910; what appears to be an NPS speedboat (Figs. 2.18 and 2.19) dating to the 1920s; and another NPS boat named *Marion*. Several commercial speedboats operated on the lake in the 1920s. One, *Adelaide* (Fig. 2.20), was used between West Thumb and the Lake Hotel, and may be a boat added to the lake fleet in 1922 to carry 11 passengers. It was propelled by a 185 hp Sterling engine at speeds of 55–65 kmph (35–40 mph) (Yellowstone Park Company 1976:5).

Fig. 2.15 Gas-powered launches at West Thumb (Yellowstone NP Archives photo no. 43549)

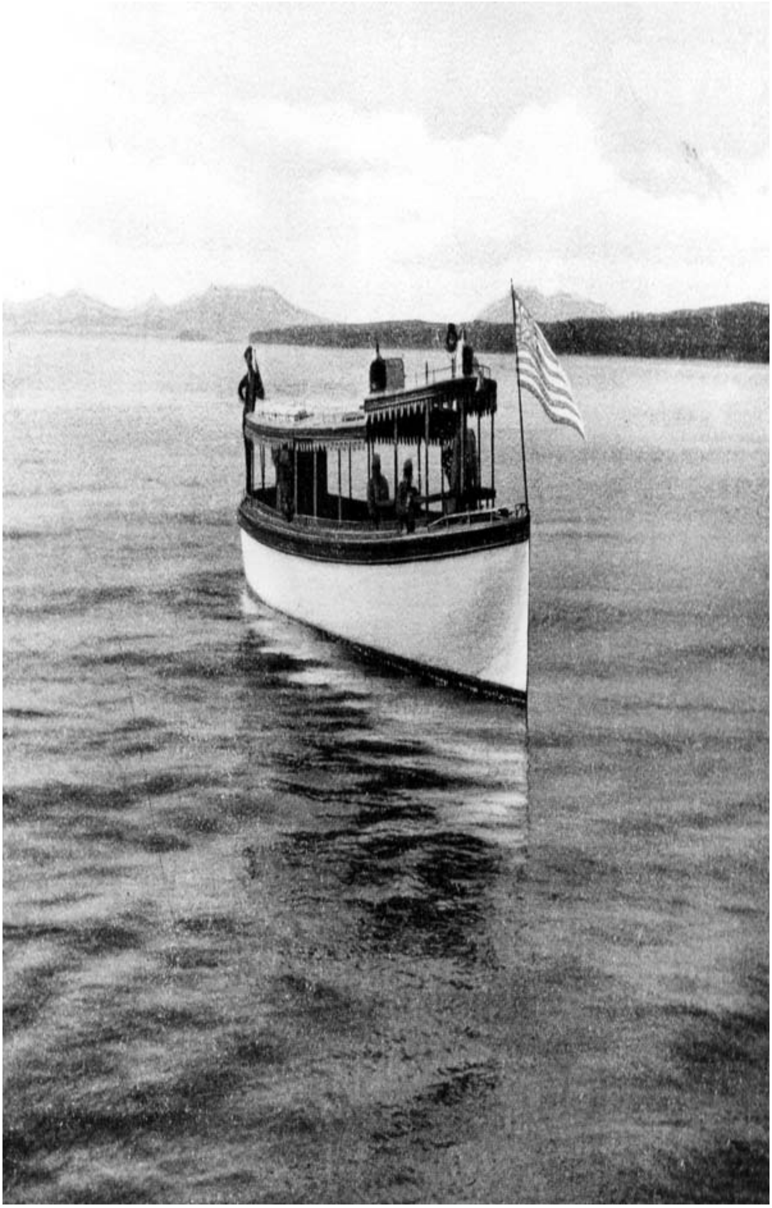

Fig. 2.16 Gas-powered launch at West Thumb (Yellowstone NP Archives photo no. 43575)

The NPS purchased an 8.5-m (28-ft) Chris Craft in 1930 for lake service (Fig. 2.21), and the Bureau of Fisheries operated several boats in 1930–1931. In 1936, the Department of the Interior provided three lake boats to the NPS: two cabin cruisers (Figs. 2.22 and 2.23) and a Coast Guard boat (Figs. 2.24 and 2.25).

Fig. 2.17 US Fisheries vessel, 1930s (Yellowstone NP Archives photo no. 9254-6)

Fig. 2.18 NPS speedboat (runabout) at Lake dock, about 1915 (Yellowstone NP Archives photo no. 29038/12004)

Fig. 2.19 NPS speedboat (runabout), October 1938 (Yellowstone NP Archives photo no. 29069/12069)

Fig. 2.20 Eleven-passenger speedboat (runabout) *Adelaide* postcard during the 1920s (Yellowstone NP Archives photo no. 87423)

Fig. 2.21 NPS 28-foot Chris Craft, 1930s (Yellowstone NP Archives photo no. 29079-4)

Fig. 2.22 Deckhouse cruiser National Park Service No. 2 at Lake dock, 1938 (Yellowstone NP Archives photo no. 29055-2/12044)

Fig. 2.23 Deckhouse cruiser National Park Service No. 1 on Yellowstone Lake (Yellowstone NP Archives photo no. 29077/12077)

Fig. 2.24 Former US Coast Gurad lifeboat *Arena Cove* at Lake, 1936 (Yellowstone NP Archives photo no. 29046-1/12016)

These boats were brought to Gardiner, Wyoming, by rail and trucked to the Lake Hotel dock boathouse, where they were reconditioned and launched as NPS Boats 1, 2, and 3. These boats were used into the 1940s and 1950s. Another NPS boat,

Fig. 2.25 *Arena Cove* being launched at Lake boathouse, 1936 (Yellowstone NP Archives photo no. 29044-3/12012)

named *Lollipop*, is reported sunk in the lake in 1940 (Dan Lenihan, 1996, personal communication). No additional information on *Lollipop* was located.

Yellowstone Lake has a rich navigation history, and many watercrafts undoubtedly remain underwater. So far, no indigenous watercraft have been located, but it is possible that submerged remains may be preserved in the lake. Of the three tour boats more than 15.24 m (50 ft) in length that operated on Yellowstone Lake between 1890 and 1930, only *E. C. Waters*' remains have been documented archeologically. Concessionaires and government agencies both operated a variety of small crafts, including cabin cruisers; steam, naphtha, and gas-powered launches; and small Fisheries Bureau boats. According to archival sources, at least 25 watercrafts operated on Yellowstone Lake before 1950. Added to these are many non-motorized rental boats and canoes, which make an impressive material record of lake navigation history. The history of these watercrafts is incomplete, but it could easily compete with the park's history of stagecoach and motorcar as critical elements of Yellowstone's tourist infrastructure relating to transportation and recreation.

Previous Archeological Work

Archeologists have conducted a variety of investigations on Yellowstone National Park. The National Park Service's Midwest Archeological Center (MWAC) has references for about 221 documents relating to Yellowstone's archeological investigations, including trip reports, cultural resource management (CRM) investigations, and more traditional archeological survey, inventory, evaluation, and excavation studies. National Register of Historic Places documentation, post-fire

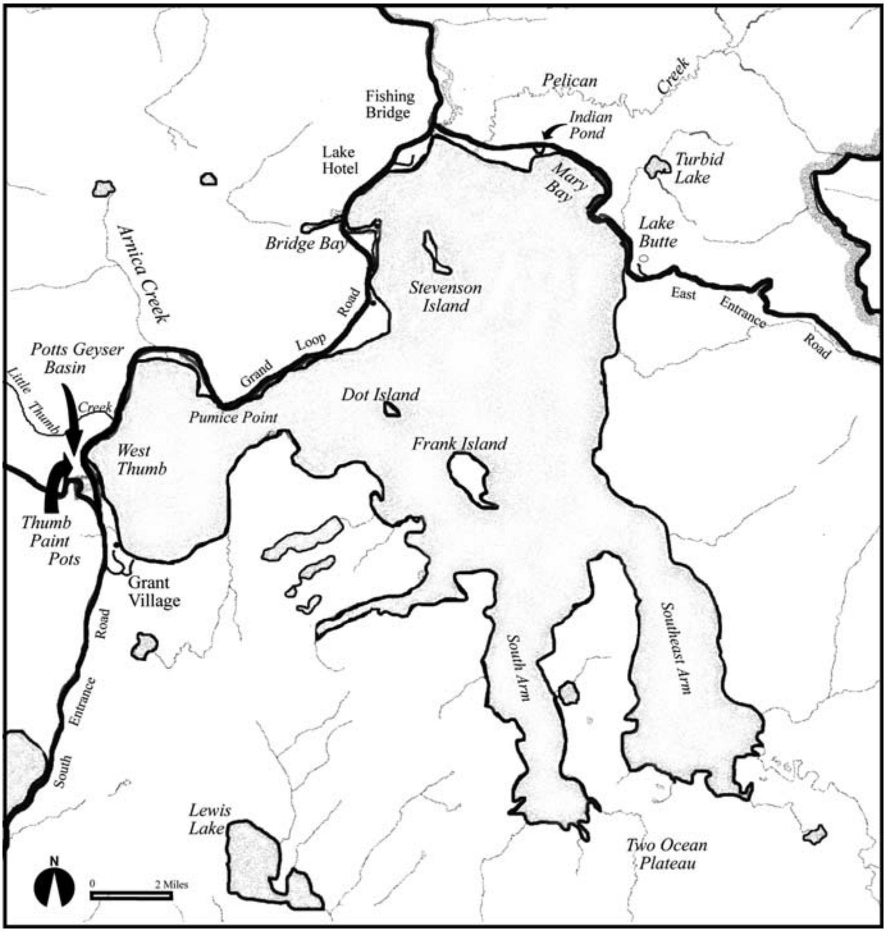

Fig. 2.26 Yellowstone Lake

surveys, and park development projects produced many of these archeological investigations. Most park archeology has focused on prehistoric sites; however, there has been a good deal of work on sites related to early park history. Some archeological work around the lake has been focused on the park's tourist infrastructure. About 30 archeological studies have been done near Yellowstone Lake, most on the north and west shores (Fig. 2.26).

Fishing Bridge/Mary Bay

The Mary Bay north shore, just east of Pelican Creek between Indian Pond and Yellowstone Lake, is noted for its evidence of human activity. As early as 1880,

observers described this area as having "...abundant evidence of frequent occupancy by Sheepeater aborigines..." in the form of "...decaying brush corrals, wickiups, and lodge-poles ... [as well as] rude stone heaps of wickiup sweathouses" (Norris 1880:587).

One of the park's largest and oldest sites, 48YE1, is located at Fishing Bridge between the lake outlet (Yellowstone River) and Pelican Creek, covering nearly the entire peninsula. Work began on this site in the 1940s when two human burials, with associated grave goods and dogs, were removed from the area during construction activities (Condon 1948; Wright et al. 1982:2–26; Cannon 1993:15). Montana State University (now University of Montana) archeologists recorded the site and five others in the northern lake area during a 1960s park-wide inventory survey (Taylor et al. 1964). According to Cannon (1993:7–9), lack of diagnostic artifacts prevented the Montana survey crew from determining site age. However, related components and Reeve's (1989) later work indicate 48YE1 may have been occupied from the Paleo-Indian period (about 7,000 B.C.E.) to Late Prehistoric times. Reeve (1989), who recovered 8,560 flaked stone, ground stone, bone, and shell artifacts along with fire-cracked rock, concluded native subsistence may have centered on fishing. Work on other sites in the area has been conducted by Cannon (1991), including a site dating to 5,000 B.C.E. on Mary Bay's south shore. Historical activity has also centered on Fishing Bridge. Recent evidence supports this location as one of Hayden's 1872 expedition campsites (Cannon 1995:40). Other work in the immediate area, conducted ahead of road development or facility improvements, includes that of Williams and Wright (1980), Baumann (1984), Cannon (1990, 1992, 1995) and Connor (1994).

Three NPS-related sites have been reported in the Lake Butte area south of Mary Bay (Hunt 1989:3–4, 21–22). Because the Fishing Bridge/Mary Bay area was a primary camping place for both European American expeditions and American Indian groups traveling through the area, there may be many more significant sites in this area. Historical documentation supports this possibility. Haines (1996a:50–52) cites several references to the lake outlet/Pelican Creek/Mary Bay vicinity as a camping area for trappers as early as 1836, when a two-day battle between a 40-person trapping party and Piegans occurred near Indian Pond (Haines 1996a:52). Five prospecting parties camped in this vicinity from 1864–1867 (Haines 1996a:68–69, 75, 79), and later exploring expeditions made the area a regular camping place between 1869 and 1871 (Haines 1996a:110). A large Nez Perce squaw camp was located at Indian Pond in 1877 (Haines 1996a:227).

Lake/Bridge Bay

The area between the lake outlet at the Yellowstone River and Bridge Bay is the most extensively developed part of the lake shore (Fig. 2.26). Several archeological projects have been conducted in this area resulting in few indigenous sites being located, but several European American sites, related mostly to hotel and park activ-

ities, being recorded. With one notable exception, native sites along this shoreline tend to be small and contain limited materials. The exception is a large site located just northeast of Bridge Bay, with a purported fish weir located just offshore. Reports of numerous artifacts encountered during road construction through this site attests to its size. Haynes (1946:104) noted: "In building the road along the lake, the workmen found many arrowheads, spearheads, skinning knives and other Indian artifacts." Johnson (1986, 1989b), Daron (1992a, 1992b, 1992c, 1992d, 1995), Cannon and Phillips (1993a), and Cannon (1995) have conducted development-related surveys and archeological testing projects in the Lake/Bridge Bay area.

Hunt (1989) recorded 11 European American sites between Lake Junction and Bridge Bay, including some associated with road construction, NPS maintenance activities, hotel trash dumps, and, on Stevenson Island, the exposed *E. C. Waters* shipwreck. Johnson and Lippencott (1989:31) first recorded the wreck remains as an archeological site (48YE13) during their post-fire assessment work. Other underwater sites are also present in the area, particularly features related to the Lake Hotel, Lake boathouse and dock, and the former fish hatchery.

West Thumb

West Thumb (Fig. 2.26) history is similar to that of Lake Village. Archeologists from Montana State University recorded the first 12 archeological sites along the West Thumb shoreline in 1958–1959 (Taylor et al. 1964). Most sites range from Grant Village on the west shore to Arnica Creek on West Thumb's north shore. These sites date from Paleo-Indian period (about 8,000 B.C.E.) to Late Prehistoric (Taylor et al. 1964:108, 179). In 1980, Samuelson (1981) discovered two more sites, which she concluded represent winter hunting and spring fishing activities. Little work was done in this area until 1992 when MWAC archeologists surveyed and tested several sites between Arnica Creek and Little Thumb Creek near the Potts Geyser Basin north of West Thumb (Cannon 1993). Archeological testing exposed hearths on an old occupation surface. Researchers also recovered sherds from 48YE449 – the only site to yield such artifacts in the park. Some older sites, deeply buried and dating back to 5,000 years, provide important information on indigenous lakeshore use relative to changing lake levels through time. Most sites in this area, like the Lake, are small with few stone artifacts. Johnson (1989b), Daron (1992e), Cannon (1992), Cannon and Phillips (1993a), Deaver (1993) and Johnson et al. (1993) have all conducted archeological investigations here as a result of park improvements in Grant Village and Potts Geyser Basin.

West Thumb, protected from prevailing winds, was apparently heavily utilized and likely contains many more indigenous sites. This area was also the center for much European American activity in the park. In 1839, trapper Osborne Russell camped at West Thumb Geyser Basin as did George Huston in 1866 (Haines 1996a:49, 72), and probably several unrecorded prospectors during the 1860s. Most later expeditions camped at the Geyser Basin: the 1869 Cook-Folsom party; the

1870 Washburn expedition; the 1871 Hayden expedition (twice along with his military escort); the 1873 military reconnaissance by Lt. Jones' troops; and Lt. Doane's winter expedition of 1876 (Haines 1996a:99, 125, 127, 148, 203, 210–211).

By 1879, there was a rough trail from the Upper Geyser Basin to West Thumb and, in 1882, General Sheridan cut a rough road from the park's south entrance to West Thumb (Haines 1996a:245, 263). The Upper Geyser Basin road to West Thumb was improved and opened to the public in 1892 (Haines 1996b:217–219), leading to increased visitation, which, in turn, led to development of army (and later NPS) visitor facilities. With the road's opening and its extension to Lake, tourists were rerouted through West Thumb as they passed through the park. As a result, many structures have been built, removed, and maintained near the geysers, all contributing to the archeological record of the West Thumb Geyser Basin. Of particular interest to this study, the West Thumb area was a terminus for the passenger steamer *Zillah* between 1891 and 1907, which had its dock near the Thumb Paint Pots.

Southeast Arm

Very little archeological work has been conducted along Yellowstone Lake's Southeast Arm (Fig. 2.26). However, three archeological sites were briefly visited during this study. One of two sites reported in the vicinity of the south shore patrol cabin were located. The "YCC Camp Site" was not relocated. A site on shoreline due south of Molly Island was located, but not formally recorded. Site 48YE707 on Terrace Point on the arm's east shore was briefly visited. This site consists of several lean-tos and was first recorded in 1989 by Cannon (1993:48–49, 140–141).

1995 SRC Reconnaissance

In August 1995, after discussions with park management, the SRC staff spent nine days in the park conducting reconnaissance-level underwater investigations at several Yellowstone Lake locations (Lenihan 1995a, 1995b).

The 1995 SRC Yellowstone Lake investigation was initiated, in part, by the impending visit of a large group of scuba divers. Later, a scuba diving club asked permission to conduct a geophysical survey to locate *Zillah*, purported to have been scuttled in deep water offshore the Lake Hotel. Park management became concerned about the potential impact to underwater archeological sites from large dive groups, and they requested advice from SRC about the park's response to the dive club survey request. The 1995 SRC investigations included dives in particular areas to determine site location, character, integrity, and archeological significance. Investigations were conducted at the Lake Hotel dock area, West Thumb Geyser Basin, and *E. C. Waters* site on Stevenson Island. Dives were made at other locations to document some of the park's natural underwater features. Recommendations by Lenihan (1995a:9–10) led to the subsequent work in 1996, as reported in this chapter.

Although much archeological research was conducted around Yellowstone Lake, the 1995–1996 SRC investigations were the first time submerged cultural resources were intensively investigated in the lake. These unique vestiges of Yellowstone's underwater cultural heritage, especially related to past tourism, are discussed in the next section.

Yellowstone Lake Archeological Survey

Yellowstone Lake maritime history and the unique maritime infrastructure that developed there is the direct result of two 19th-century cultural processes: industrial capitalist expansion, in the form of the westward spread of railroads, and the rise of Western tourism. These two processes are directly linked and together shaped the material remains found in Yellowstone Lake today. Through its connection to westward rail expansion and tourist development, Yellowstone Lake's passenger steamer trade and other elements of its maritime infrastructure are linked to the larger capitalist world-system. As a subset of this larger system, related maritime elements on Yellowstone Lake can be called a "maritime system."

Yellowstone Lake Maritime System

The maritime system concept embodies a modified world-system perspective, where a maritime system is a subset of the larger capitalist world-system, a concept borrowed from Wallerstein (1974, 1979, 1980, 1989). According to Orser (1996:83) the "…hallmark of the world-system perspective is that since the sixteenth century, a single capitalist world-economy has been the driving force behind the creation of the modern world. The modern world is characterized by a single economy that is colonial, international, and expanding." Although models based on Wallerstein's world system theory are no longer fashionable in contemporary sociocultural anthropology, and have been severely critiqued in archeology (Rogers 2005:335), as an influential model for the spread of capitalism, they nonetheless have had a significant impact on historical archeology.

Wallerstein's original framework outlined expansion of the European capitalist system from the 16th to the 19th century, focusing specifically on a worldwide division of labor and on economic relationships between developed (core) and developing (peripheral and semi-peripheral) states. Initial use of world systems models in archeology was partly a reaction against processual, neo-evolutionary frameworks that stressed environmental adaptation over social interaction and exchange. As postprocessual approaches became more widespread, researchers sought new theoretical perspectives that acknowledged historical contingencies rather than seeking cross-cultural and cross-temporal generalizations (Champion 1989; Kohl 1989; McGuire 1989). In addition to the overall historical perspective world systems approaches bring to archeology, part of their heuristic value is to reinforce the idea

that societies (or elements within societies) are interconnected and cannot be evaluated in isolation (Rowlands 1987). A world systems framework also accommodates a hierarchical, multiscalar approach and allows a diachronic view as interregional relationships change over time (Champion 1989; Rice 1998).

Despite some advantages offered by a world systems perspective in historical and maritime archeology, a number of critiques severely limit its uncritical application. First, many researchers suggest world systems models deny local agency by assuming that the core is active and the periphery is a passive recipient of innovation and change, as well as assuming a fundamental power asymmetry with the core politically dominating the periphery (McGuire 1989; Lightfoot and Martinez 1995; Dietler 1998, 2005; Rice 1998; Schortman and Urban 1998; Stein 1998). A second, but related, critique is that local and regional variability is ignored in a world systems perspective, which suggests that the core always controls exchange (Dietler 1998; Rice 1998; Stein 1998) and outcomes of intersocietal interactions are determined by each society's position within a broader interregional exchange network (Schortman and Urban 1998:105). The heuristic value of world systems models in some cases is diminished if its application inadvertently obscures past socioeconomic relations by essentializing groups as either core or periphery (Rice 1998; Schortman and Urban 1998; Dietler 1989:127; see also Dietler 2005) or assuming a priori relationships based on economic inequality.

Despite widespread criticism of world-systems theory in general, however, most contemporary researchers acknowledge that local archeological cases can only be understood fully when placed within a broader regional context. Agency and individual action are constrained by larger structural forces, often economic, and it is this interplay between structure and agency that researchers must balance (Champion 1989; Lightfoot and Martinez 1995; Dietler 1998). For example, while Sahlins recognizes the theoretical and analytical value of structures and world systems as long-term undercurrents that powerfully influence people's lives, he suggests they are not deterministic. These structures are in turn shaped and transformed by historically situated events (Sahlins 1981:111).

In its relation to the capitalist world-system, Yellowstone Lake maritime system archeology can also be compared to the archeology of mining frontiers. Hardesty (1988:1) writes, "...mining colonies were financed, manned, and supplied from the urban centers of America and Europe. Despite their geographical remoteness and small size, the colonies were linked into a vast transportation, communications, demographic, and economic network on a national and international scale." Even a seemingly isolated example as the maritime tourist infrastructure on Yellowstone Lake has direct ties to the network created by the capitalist world-system, under the influence of the American railroads. In approaching this type of study, Orser (1994:5) writes "...archeologists conducting research at sites associated in any way with the modern world ... must attempt to frame their studies in the broadest possible terms." The maritime material record in Yellowstone Lake is most successfully understood when placed in this larger historical and cultural context.

The maritime system is a way of conceptualizing the integrated maritime activities of a particular region (large or small) or time period, and their relationship

to the larger capitalist world-system. A maritime system incorporates all related aspects of a maritime world, from ships, shipyards, waterfronts, custom houses, outfitters, cargo, and trade goods; to insurance companies, classification rules, and salvage industry; and the material record these activities produced. This idea is similar in concept to the regional approach used in maritime archeology (Murphy and Saltus 1981; Lenihan 1987; Murphy 1993; Conlin 1994; Kenderdine 1994; Staniforth 1997; Murphy 1997), which is a methodology that looks at wide areas and on the interconnections of shipwrecks in a region, instead of focusing solely on individual shipwrecks as isolated “accidental” events. The concept is also related to the cultural landscape or “maritime landscape” concept that has been growing in popularity in recent years (Westerdahl 1992; Bannerman and Jones 1999; Esser 1999; McCarthy 1999). A maritime landscape is one of the material manifestations of a maritime system. The maritime system approach provides a method to address a wide context that focuses on the systemic behavior responsible for the material record. This analytical approach is particularly fruitful in using the archeological record to compare and contrast behavior among different maritime systems, for example between contemporary maritime systems or even temporally distant systems.

Maritime systems-oriented research may address the material remains produced by the system, which are removed from the cultural context and enter an archeological context, or which were salvaged and recycled but still retain their connection to the maritime system (for example, *E. C. Waters*’ boiler used to heat the Lake Hotel). Orser (1996:116) and Staniforth (1996) have both discussed the “recontextualization” of artifacts in this way. This approach is similar to Hardesty’s (1988) “feature systems,” a concept that groups related, though sometimes physically disparate, features associated with Western mining sites. Industrial mining processes left material remains and activity areas that are directly related, though sometimes miles apart. Each feature cannot be successfully understood in isolation, but must be viewed as separate pieces of an integrated whole (Hardesty 1988:9–11), in this case, the maritime system.

Yellowstone Lake provides a useful focus for discussing the maritime system approach because it is isolated, limited spatially to Yellowstone Lake, and limited temporally to the late 19th and early 20th centuries. It is also uniquely limited in scope to one specific trade, tourism, which allows easier analysis than more complicated systems. Tourism also ties the maritime sites in Yellowstone Lake to other historical sites in the park, such as early hotel remains (Corbin et al. 2003). The Yellowstone Lake maritime system is a localized, specialized phenomenon that developed in a particular cultural context (Western industrial expansion and tourism) and in a particular environment (isolated, high mountain lake). Complex social and economic processes at work across the country influenced and shaped development of tourist facilities in Yellowstone, including the passenger steamer trade. Because the Yellowstone Lake maritime system is linked to the larger system of late-19th-century tourism and industrial capitalist expansion in the United States, we expected a number of similarities with contemporary maritime systems. But because of Yellowstone’s isolation and unique environmental conditions, we also expected to see

distinct differences in the material record of the Yellowstone Lake Maritime System compared to others. The archeological record present in Yellowstone Lake, therefore, should reflect both the homogeneity and variability of Yellowstone's unique maritime system when compared to other contemporary systems, such as the Great Lakes.

Archeological remains from the Yellowstone Lake maritime system include historic dock remains at West Thumb and the village of Lake, the Lake boathouse and marine railway, a small steam launch located underwater near the Lake Hotel, the *E. C. Waters* site on Stevenson Island, and at least four submerged small boats from the early-20th-century rental boat fleet. The most extensive and interesting aspect of the Yellowstone Lake Maritime System recorded was *E. C. Waters*, which is discussed in detail below. Results of our archeological investigations in Yellowstone Lake are outlined below by geographic area and major sites (Fig. 2.27).

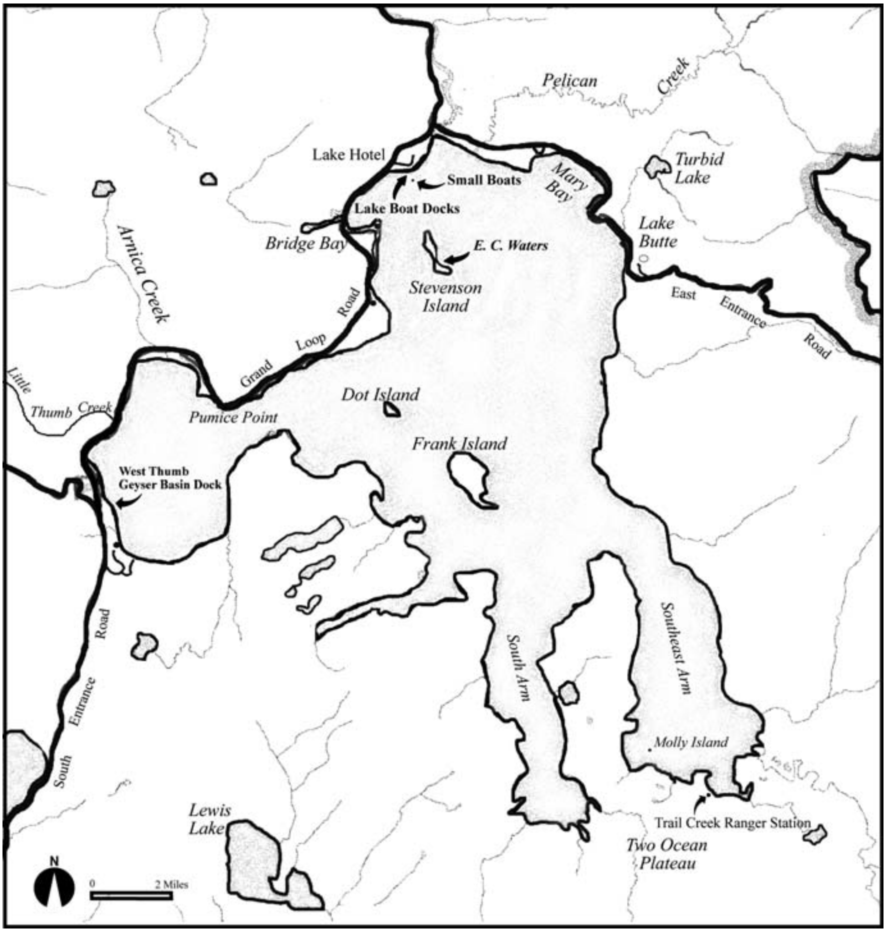

Fig. 2.27 Archeological sites representing remains of Yellowstone Lake's maritime system

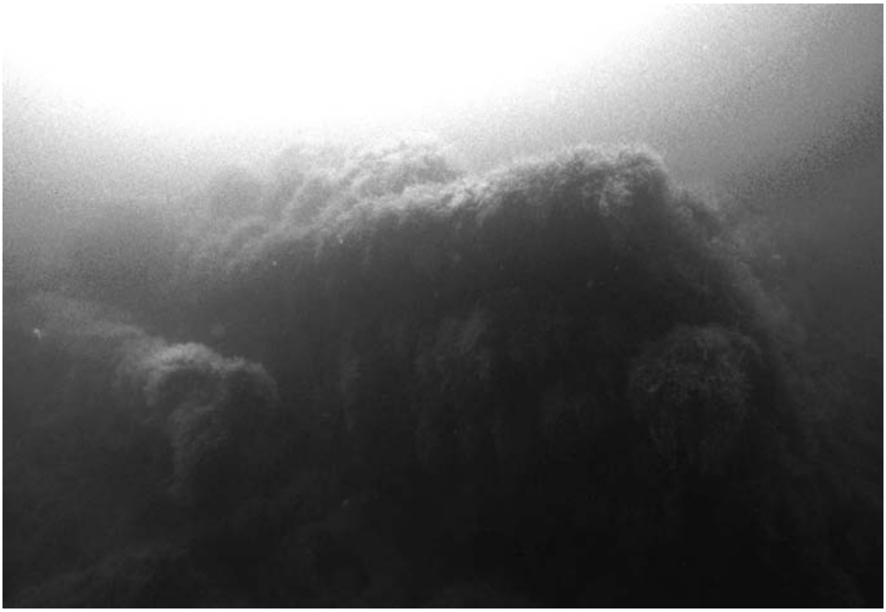

Fig. 2.28 Algae-covered dock crib at West Thumb. NPS photo by Brett Seymour

West Thumb Geyser Basin

The focus of underwater investigation in West Thumb was an area east of the West Thumb Geyser Basin boardwalk, specifically the remains of the historical West Thumb crib-style dock. We documented the dock remains with scale drawings, videography and photography, and Differential Global Positioning System (DGPS) points to delineate the general dock outline and precisely position the cribbing. Water conditions here promote a thick growth of filamentous algae that covers the bottom (Fig. 2.28) making visual survey difficult. However, in addition to the historical dock remains, another curious find was a wagon wheel. The wheel (Fig. 2.29) is 1.4 m (4 ft 7 in.) in diameter, has tapered spokes and a metal tire 5.71 cm (2.25-in.) wide × 0.32 cm (0.125-in.) thick. The rim is composed of two felloes with a metal wedge or shim inserted at one seam to increase the diameter and tighten the fit. Other than some natural deterioration from years in the lake, the wheel is in good condition and shows little damage or wear (Fig. 2.30). According to District Ranger John Lounsbury, an historical wagon aficionado, the wheel size and construction suggest a small stagecoach because it appears too big for a buggy and too small for a freight wagon. Park Archeologist Ann Johnson (1997, personal communication) confirmed the wheel diameter matches those of the smaller stagecoaches in the park vehicle collection. There were perhaps five park stagecoach lines, and each stagecoach had a distinct paint scheme, which may have been useful for determining an association for this wheel. Unfortunately, no paint remained on the wheel. As a possible *terminus ante quem*, the last horse-drawn lines operated in the 1916 season after which

Fig. 2.29 Wagon wheel at West Thumb. NPS photo by Brett Seymour

motorized tours were conducted (Chittenden 1924:344), which indicates this wheel is at least 80 years old.

The historical dock remains at West Thumb provide the link between Yellowstone Lake's maritime system and the broader tourist system in the park. Sinter deposits from the active geysers coat the lakeshore in this area and form an underwater shelf immediately offshore the thermal features. A high portion of the shelf extends above water line about 3.35 m (11 ft) west of the dock remains and was incorporated into the original dock (Fig. 2.31). The dock remains consist of basal portions of six log cribs set three to a side to form an L-shape. All six cribs, spaced a consistent 6.71 m (22 ft) apart, have spilled rock out all sides (Fig. 2.32). The east-west portion is a linear rock pile extending along the lake bottom for a distance of 26 m (85 ft); the top of the rocks varies in depth below the surface from 1 m (3 ft) to 2 m (7 ft), while the bottom of the rocks ranges in depth from 1.5 m (5 ft) to 3.5 m (12 ft). Cribs 1 and 2 are less intact than other cribs; their rocks have spilled out-

Fig. 2.30 Close-up of West Thumb wagon wheel. NPS photo by John Brooks

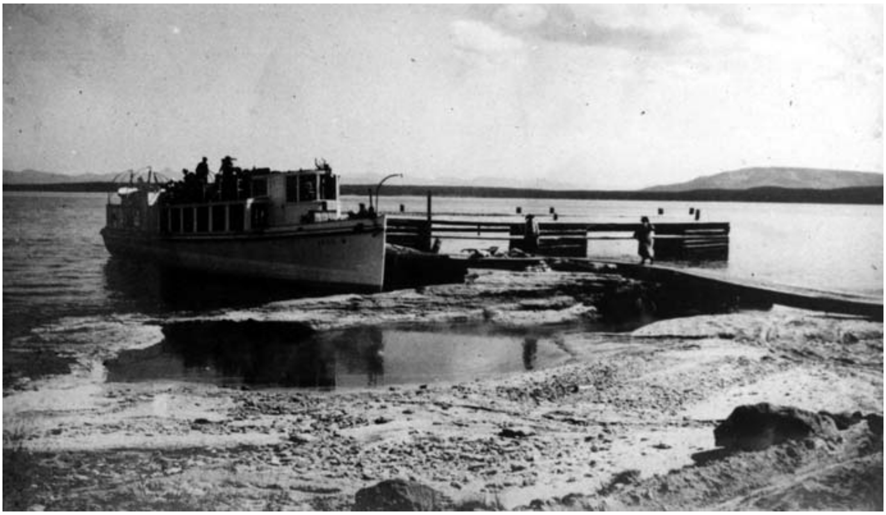

Fig. 2.31 *Jean D* docked at West Thumb. Note the cribbing and walkway (Yellowstone NP Archives photo no. 88438)

ward into mixed piles presenting the appearance of a jetty rather than discrete cribs. Numerous logs, cable, iron I-beams and a terra cotta pipe segment were observed in the rock piles. Crib 3, at the easternmost end of this dock section, is mostly intact and forms an acute angle; the alignment of cribs 4–6 extends about 35 m (115 ft) to the south. Cribs 4 and 5 have distinct crib remnants and less rock spillage to their

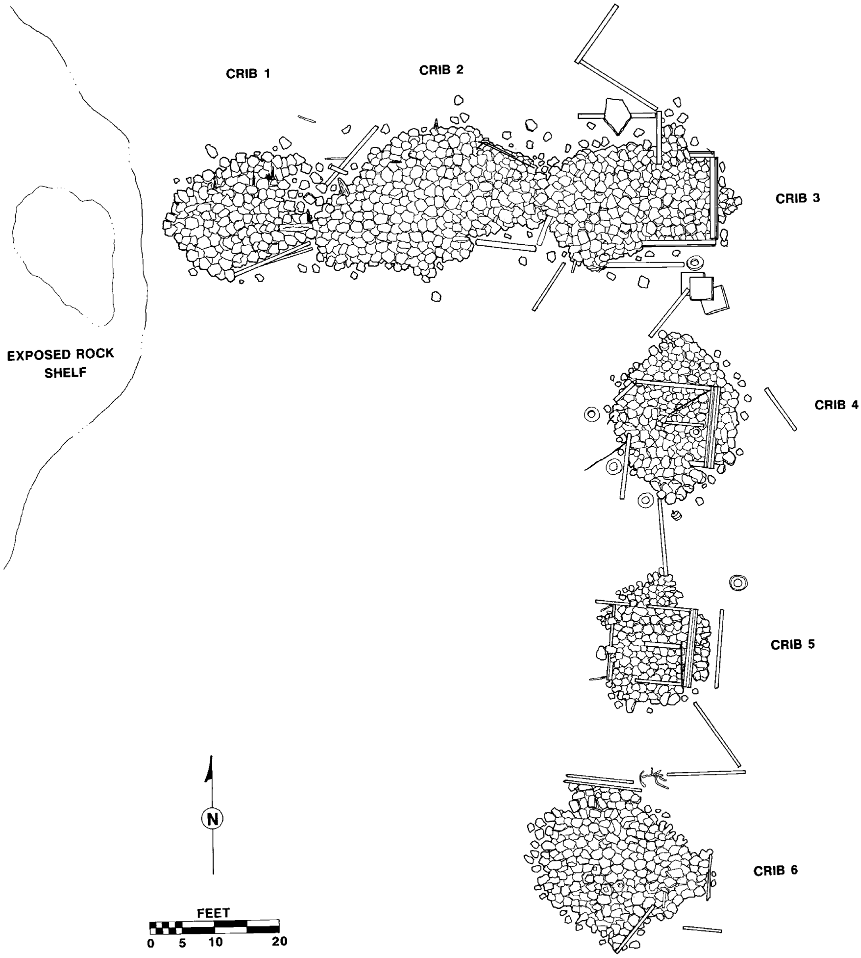

Fig. 2.32 Plan view site map of the West Thumb dock cribs. Drawing by Jim Bradford and Matt Russell

sides (see Figs. 2.32 and 2.33). Crib 6 is a distinct pile of rocks, but shows very little original crib form. Several automobile tires, crib logs, miscellaneous cable, and concrete slabs were observed between cribs 3 and 6. As depicted in Fig. 2.32, the crib alignment is not a true L-shape, but instead angles more to the west following the submerged shallow slope. One explanation for this alignment is that the builders were likely taking advantage of the shallow shelf slope edge, which reduced construction materials and allowed access to the deep water directly offshore.

The cribs are about 3.5 m (12 ft) on a side, with what appears to be an interior wall of logs dividing each crib into two parts. The cribs are made of logs ranging

Fig. 2.33 West Thumb dock crib. NPS photo by Brett Seymour

from 18 cm (7 in.) to 28 cm (11 in.) in diameter, with the majority about 20 cm (8 in.) in diameter. Almost solid algae growth and spilled rocks prevent complete documentation of the crib corners. Logs on all sides abut those above and below, creating a solid wall. The lower logs are shortened to accommodate the lake bottom slope, with those higher in the wall being the full 3.5 m (12 ft) in length or, in some cases, two logs with ends abutting to achieve the total length of a side. The crib corners are fastened with a single 2.5-cm (1-in.) iron or steel rod driven through the entire height of the crib side. The only evidence of overlap is in Crib 5, where the top course of logs has a single log overlap at each corner, with the corresponding next-side log abutting the overlap and tied at the next corner. This appears to leave a weak corner at the crib bottom, which might allow separation unless other fasteners were driven through the courses of logs at other locations. No evidence of fasteners other than at the corners was observed, nor were any horizontal ties (dogs) between logs. Algal growth may have obscured these detail features.

Crib 5 is a typical example and will be discussed in detail. The east wall is 2.1 m (7 ft) high, while the west wall, because of lake bed slope, is 1.2 m (4 ft) high. Two bent corner fasteners at the crib top have exposed lengths of about 2.6 m (8 ft 6 in.). Typical depth below surface at the crib tops is 1.8 m (6 ft). Subtracting the 1.8 m (6 ft) depth below surface from the 2.6 m (8.5 ft) exposed fastener length indicates the crib extended 0.7 m (2.5 ft) above water level. With the dock structure attached, the dock height above lake level would have been about 1 m (3 ft) (see Figs. 2.31 and

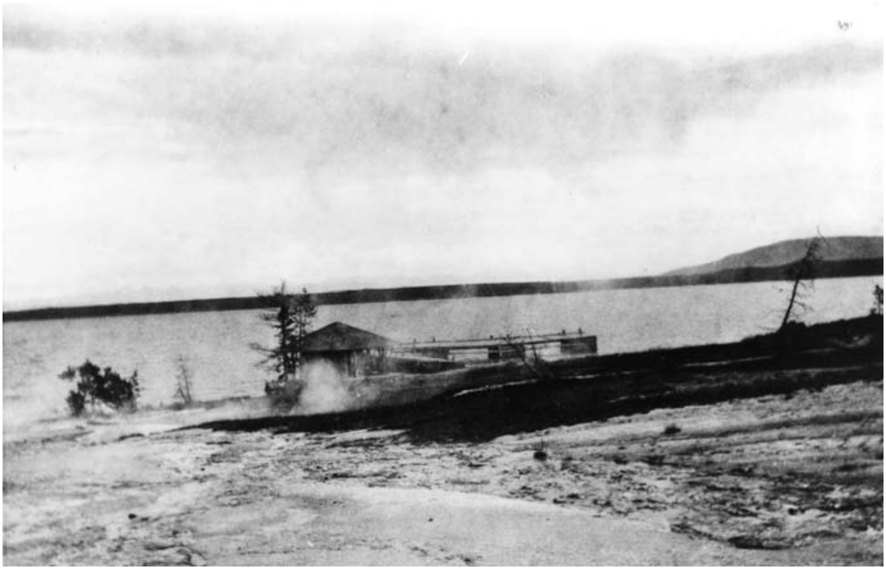

Fig. 2.34 West Thumb dock (Yellowstone NP Archives photo no. 94212)

2.34), sufficient to stay above lake ice in this protected area of the Thumb, which receives little ice shelving.

As shown in Fig. 2.31, the exposed shelf rock was used as a dock support. The original dock extended eastward from shore approximately 25 m (80 ft) to the exposed rock (with some small supports in very shallow water), incorporated the exposed rock as a support, then utilized cribs 2.5 cm (1 in.) and 5 cm (2 in.) about 1.5 m (5 ft) of water, and continued to the end of this segment at Crib 3 in about 3.7 m (12 ft) of water. Here the dock turned south, using cribs 4–6, for a distance of about 35 m (115 ft) to the end of the L. This configuration produced 3.7 m (12 ft) to 4 m (13 ft) of depth on the dock's offshore side at current lake level.

Crib dimensions indicate each would encase about 47 m^3 (1,656 ft^3) of rock fill to the lake surface, or about 51 m^3 (1,800 ft^3) to the bottom of the dock. The four north-south cribs (cribs 3–6) contained about 188 m^3 (6,624 ft^3) of rock. Cribs 1 and 2 contained about 61 m^3 (2,160 ft^3), which gives an estimated total dock fill volume of about 249 m^3 (8,784 ft^3), or about 297 m^3 (325 yd^3) of broken rock ranging from fist size to 0.3 m (1 ft) $\times$ 0.6 m (2 ft) $\times$ 0.6 m (2 ft). Rock type and origin are unknown, but acquisition, transportation, and handling of that much material involved considerable effort.

The uniformity of the depth of Cribs 3–6 at 1.8 m (6 ft) below the surface (a similar depth as the single crib located at the former Lake Hotel dock), suggests the cribs were deliberately razed to this level when the dock structure was removed. This may have been done to reduce them as navigation hazards. Intentional razing to a uniform depth seems more likely than it being the result of ice action, because

Fig. 2.35 *Zillah* docked at West Thumb, about 1900 (Yellowstone NP Archives)

ice rarely gets more than 0.6 m (2 ft) thick in the winter (John Lounsbury, 1996, personal communication). Dock construction date and builder(s) are unknown, but the docks probably went through several periods of rebuilding since first constructed. E. C. Waters undoubtedly constructed the original dock. *Zillah* docked at West Thumb from the 1890s through the 1910s (Fig. 2.35), as did other lake boats (see Fig. 2.31). Photographs show a dock in this area as late as the mid-1930s (Allen and Day 1935:130). It is not known when the dock was removed, but it was likely present until the early 1960s when many older West Thumb facilities were removed and relocated or replaced by the NPS's Mission 66 developments.

Lake Boat Docks (48YE247)

Despite the rich history of tourist-related infrastructure in the Lake Hotel dock area, little material evidence of the various facilities remains today. Before the turn of the century, E. C. Waters proposed and built a dock at Lake, which included the boat management concession headquarters. Shore facilities at Lake included the largest Yellowstone Lake docks (Fig. 2.36), the primary rental boat operation (Fig. 2.37), the main dock for *Zillah* and other lake boats, a boathouse (Fig. 2.38), a marine railway for launching and dry docking boats, and a fish hatchery. Waters built the original dock in the 1890s and completed a long dock extending south from shore with a short east leg by the turn of the century. This dock configuration was used

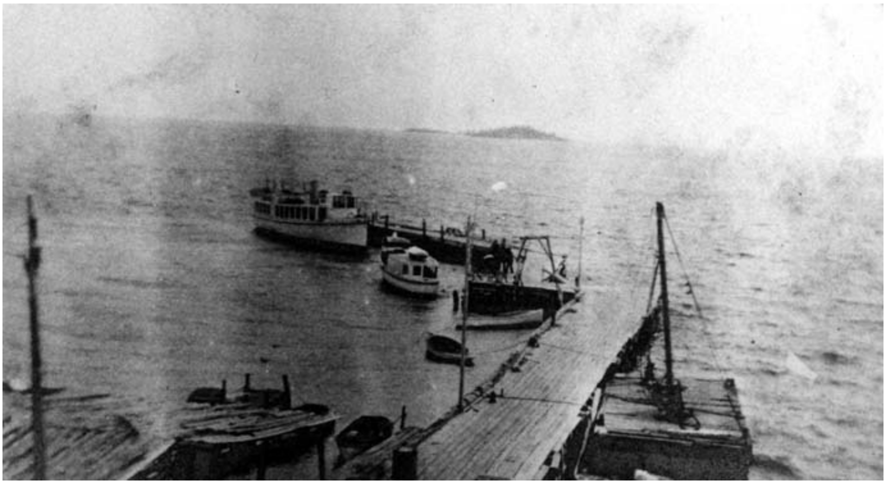

Fig. 2.36 *Jean D* at the Lake dock, about 1905 (Yellowstone NP Archives photo no. 88090)

Fig. 2.37 Lake dock rental boats (Yellowstone NP Archives photo no. 36371)

until major extension and revisions were completed between August and October 1936. These revisions employed a pile driver, as in the original construction. The dock was extended, a launch ramp constructed and a trestle track added from the road to the water providing a means of dry docking large boats, and a small boat

Fig. 2.38 Lake boathouse (Yellowstone NP Archives photo no. 61-699)

ramp was built. All are well documented in the park photographic archives. In spring 1937, the docks were severely damaged by ice, which resulted in additional ice protection measures in October 1938. The fish hatchery was added to the facilities in the 1910s, and all vestiges of these structures, with exception of the boathouse, were removed around 1962.

Underwater features include a single crib remnant from the dock and a short marine railway section still on the lake bottom. The dock crib contains only three courses of logs and has a spike projecting out of the top, the upper end of which is at a depth of 1.8 m (6 ft). In addition, cobbles from additional cribs are spread around the lake bottom, as well as wooden crib members and modern artifacts (Lenihan 1995a:1). Park resource managers and divers conducted a more extensive investigation of the Lake docks in October 1998. They officially recorded the site and issued it an archeological site number, 48YE247. At that time, they observed a large scatter of rocks 4.6 m (15 ft) wide extending in an arc for 274 m (900 ft); a second scatter, also 4.6 m (15 ft) wide, extending for 52 m (170 ft); and four intact rock-filled cribs (Dave Price, 1999, personal communication). The marine railway section is located in shallow water and consists of a short segment of ties and rails still in place. The railway, located just west of the later fisheries dock, was used to launch the *E. C. Waters* in 1905 (Aubrey Haines, 1996, personal communication) and three NPS boats brought to the park in 1936.

Fig. 2.39 Small launch off Lake Hotel. NPS photo by John Brooks

Small Boats

During the archeological survey in the Lake Hotel vicinity, we located and dived a launch on the lake bottom near the dock (Figs. 2.39 –2.40). The launch's rudder was removed by park divers sometime in 1994–1995, and it is currently in the Bridge Bay Marina Ranger Station. In addition, side scan sonar revealed a clear sonogram of a cluster of small boats about 0.32 km (0.2 mile) southeast of Lake Hotel. A single dive on these craft confirmed four boats sitting in 7 m (23 ft) of water (Fig. 2.41). All four are of similar design and oriented in the same direction (Figs. 2.42 –2.45). They ranged in length from 4.11 m (13.5 ft) to 4.72 m (14 ft), and a width from 1.09 m (3 ft 7 in.) to 1.14 m (3 ft 9 in.). All four have small seats fore and aft, two have a single center seat, one has two such seats, and the fourth lacks center seats. They compare exactly with the rental boats shown in Figs. 2.46 and 2.47, which date to 1941 and were apparently scuttled after becoming obsolete.

Fig. 2.40 Hotel launch stern. NPS photo by John Brooks

Zillah

Despite local lore that *Zillah* was taken from the old fisheries dock, towed out to deep water and scuttled, no evidence of it in that area was noted during extensive side scan sonar survey of the area to a depth of more than 60 m (200 ft). This area was selected based on information that *Zillah* rested on the bottom in the general area southwest of the old docks. Archival information on *Zillah*'s fate is contradictory. *Zillah* is described as making "her last voyage out into Yellowstone Lake, where her hull was opened and she came to rest on the bottom where she remains today" (Yellowstone Park Company 1995:7). In another article, reference is made that the Yellowstone Park Boat Company dismantled it in 1929 (Yellowstone Park Company 1976:5). In a telephone conversation with Aubrey Haines after the 1996 fieldwork, he commented that he had found a reference to *Zillah* having been cut up and sold for scrap, perhaps a confirmation of its being dismantled. Definitive references to *Zillah*'s final disposition have yet to be found.

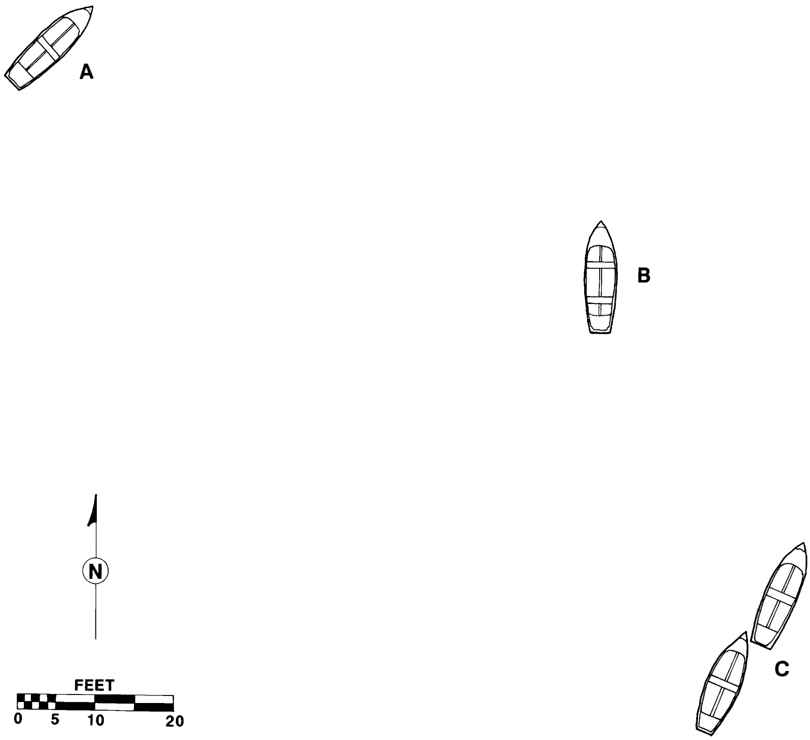

Fig. 2.41 Field sketch of four small rental boats off Lake Hotel. Drawing by Paul Neidinger

E. C. Waters (48YE13)

E. C. Waters, the largest vessel ever operated on Yellowstone Lake, was a 38-m (125-ft) long, wooden-hulled, single-screw passenger steamer with a 8-m (26-ft) beam (Haines 1996b:127). Although depth of hold and tonnage are not documented for this vessel, they are estimated to have been a 3-m (10-ft) depth of hold and between 200 and 250 tons. Today, *E. C. Waters*' remains lay partially exposed and awash on Stevenson Island's east shore (Figs. 2.48 and 2.49). Initial field observations of site 48YE13 suggested the wreckage consists of the largely intact lower hull below the turn of the bilge, much of the drive train (excluding engine and boiler), and many scattered features and artifacts. Major structural features include the keel, main keelson, sister keelsons, floors, the first and second futtocks of most frame-pairs, engine bed, propeller shaft and bearings, thrust bearing, propeller, hull planking, ceiling planking and deck machinery, along with numerous scattered fittings (Fig. 2.50). The hull, listing 27° to port, is 37.1 m (121 ft 7 in.) long from propeller to the forward-most attached hull plank, and the bow points due east.

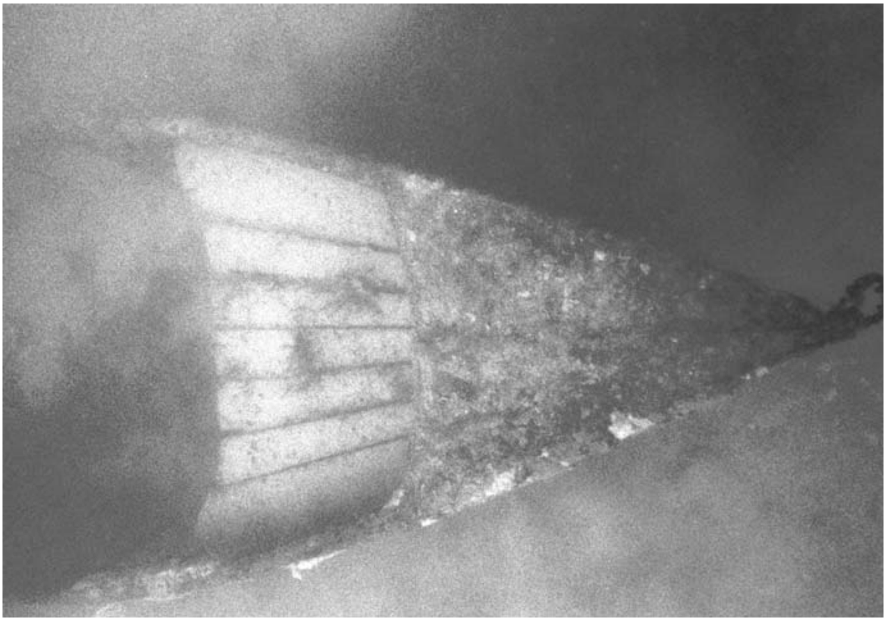

Fig. 2.42 Small boat bow. NPS photo by John Brooks

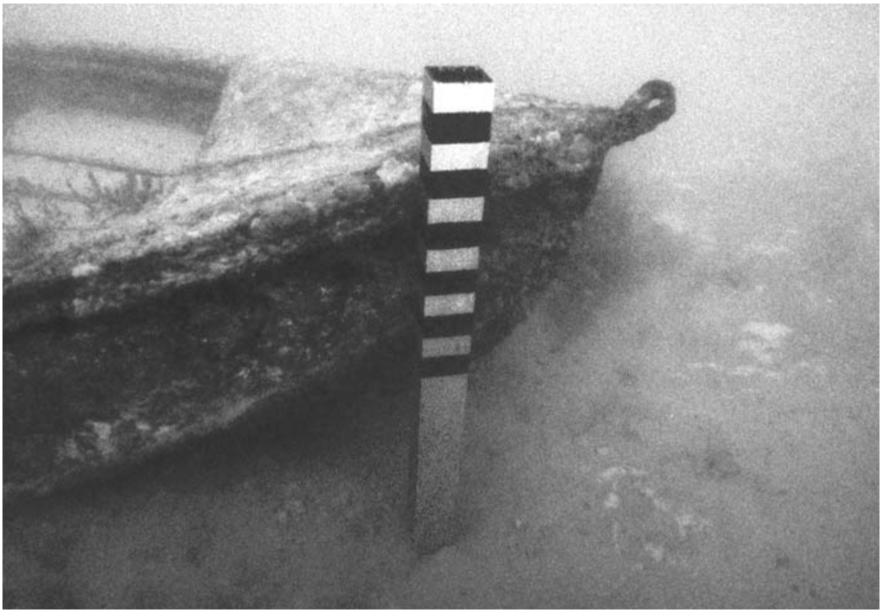

Fig. 2.43 Small boat bow. Scale in inches. NPS photo by John Brooks

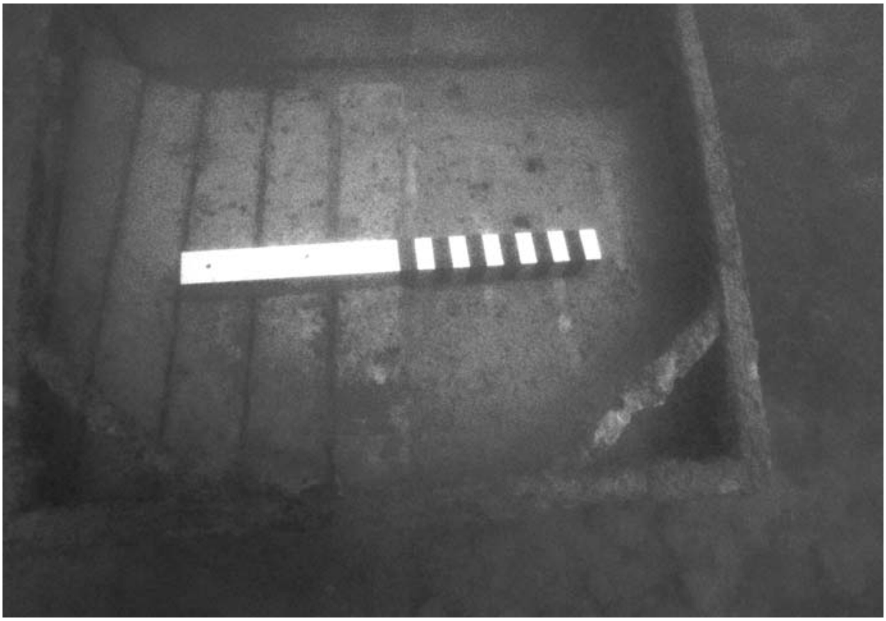

Fig. 2.44 Small boats tern. Scale in feet and inches. NPS photo by John Brooks

Fig. 2.45 Small boat stern. Scale in feet and inches. NPS photo by John Brooks

Fig. 2.46 Yellowstone Park Company rental boat #78 (Yellowstone NP Archives photo no. 29078/12078)

Fig. 2.47 Yellowstone Park Company rental boat #78 (Yellowstone NP Archives photo no. 29078-2)

Fig. 2.48 View southeast of *E. C. Waters*' remains on Stevenson Island's eastern shore. NPS photo by John Brooks

Fig. 2.49 View northeast of *E. C. Waters*' remains. NPS photo by John Brooks

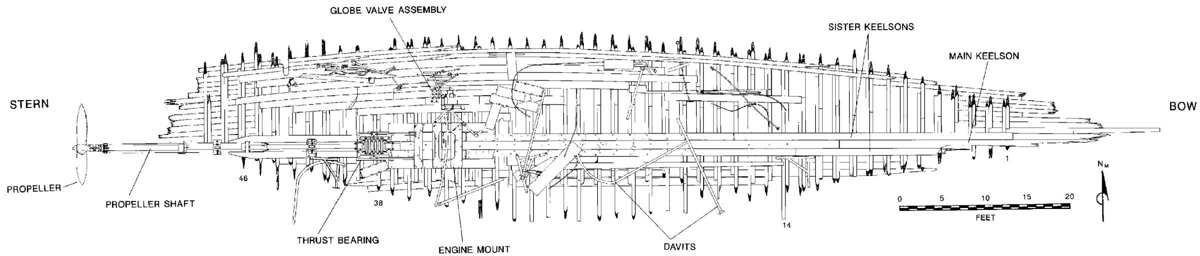

Fig. 2.50 Plan view of *E. C. Waters*' hull remains. Numbers along the lower edge are frame pair numbers. Drawing by Jim Bradford and Matt Russell

The SRC field team, consisting of two archeologists and a photographer, documented the site during a six-day period in August 1996. This site assessment employed a nondestructive, noninvasive approach; no artifacts were collected and only exposed features were documented. The one exception was the capstan, buried in the sand 23 m (75 ft) south of the hull, which was exposed by hand fanning the sediments for documentation and photography and then reburied. The documentation team established a baseline along the wreck's centerline structure and mapped site features using baseline trilateration and direct measurements. The main features, including *E. C. Waters*' hull, remaining propulsion system, and scattered site features were also drawn to scale. Unfortunately, limited time for this assessment did not allow complete documentation of all site details. For example, the many small, portable artifacts located between the vessel frames could not be completely documented, and other details, such as the hull fastening patterns, were documented through recording only a representative sample. No wood samples were taken during this wholly noninvasive site assessment.

Hull Remains

At August 1996 lake levels, the *E. C. Waters*' centerline (keelson and propeller shaft) was just at the lake's surface. Because of the 27° port list, the submerged port side is better preserved than the starboard side, which is mostly exposed above water level. Port-side hull remains are extant to the turn of the bilge, while the starboard-side hull consists of burnt stubs of several floors and futtocks (frames or "ribs"), and a few hull (outer) and ceiling (inner) planks. Overall, *E. C. Waters*' preserved lower hull remains represent a unique opportunity to study turn-of-the-century, high-altitude, Western lake-steamer construction.

The keel is a vessel's main centerline structural member, running the length of the vessel to provide longitudinal support. In wooden vessels it is composed of long timbers, scarfed (joined) together at their ends (Kerchove 1961:418). *E. C. Waters*' keel dimensions are 25.4 cm (10 in.) sided (width), 27.9 cm (11 in.) molded (height), and approximately 35.7 m (117 ft) long. Only 9.3 m (30 ft 6 in.) of the keel's forward part is exposed, and the forward end is splintered and worn with an eroded upward slant on its lower face that has removed any evidence of the keel and stempost joint. The keel's aft end, where it meets the propeller post, or sternpost, is buried, obscuring that joint and making it impossible to determine if the keel had an aft extension to the rudder post, or if the rudder was supported by a rudder shoe, or skeg. Because the keel is buried here, an exact keel length measurement is impossible. One horizontal hook scarf is visible in the keel, beginning 5.6 m (18 ft 6 in.) aft of the keel's forward end. The scarf, which angles up toward the bow, is 1.35 m (4 ft 5 in.) long horizontally, 2.03 m (5 ft 2 in.) long diagonally, with a hook offset of 3.81 cm (1.5 in.). The scarf extends over only three frame pairs, less than the four recommended in the following decade (Desmond 1984:46 [1919]), but long enough to meet required specifications of the more contemporaneous Great Lakes Register (1908:180), which states keel scarf length should be four and one-half times the keel's sided dimension. To meet this requirement, *E. C. Waters*' 25.4-cm (10-

in.)-sided keel required a minimum scarf length of 1.13 m (3 ft 9 in.). Because longer scarf lengths are stronger than shorter ones, *E. C. Waters* was built more conservatively in this regard than required by contemporary Great Lakes practice. There are likely other scarfs along the keel's length, but the rest of the keel is buried and could not be examined.

Other than the worn, splintered forward end, the only other keel damage noted was that the aft end of the forward keel section, below the scarf, was broken-off and missing. This damage is unusual, and there is no evidence of how it occurred. Keel rabbets (for securing hull planks) could not be observed, and no false keel (an expendable plank placed on the keel bottom to protect the keel) was present on the keel's exposed end.

None of *E. C. Waters*' stem assembly remains on-site, and nothing related was located in the surrounding area during a side scan sonar search. The forward-most wreckage consists of the keel, keelson, filler deadwood between the keel and keelson, and outer hull planking. No deadwood was present on top of the forward end of the main keelson.

The vessel's sternpost, or propeller post, is present and is sided 20.3 cm (8 in.) and molded 27.9 cm (11 in.). The sternpost heel, where it joins the keel, and the keel extension or rudder shoe that supports the rudder post and rudder are buried and were not observed. The sternpost protrudes 0.89 m (2 ft 11 in.) above the sediment, to a point just below the propeller shaft, where it is broken off inside the iron bushing assembly that encases it. The stern bearing and other features associated with the sternpost will be described below with the propulsion system.

E. C. Waters' frames are constructed from horizontal pairs of timbers that cross the keel perpendicularly, and are located between the underlying keel and the overlying keelson (Fig. 2.51). These pairs of timbers, made up of floors and futtocks, extended from the keel amidships to the turn of the bilge and continued up the hull side. The frames on *E. C. Waters*' port side are now broken at the turn of the bilge; those on the starboard are broken near the keel. Individual floor and futtock timbers are joined end to end with butt joints that are staggered so that one half of each frame pair overlaps the butt joints of the other half to maximize strength. This paired frame arrangement with staggered butt joints is known as "double framing."

E. C. Waters' framing was constructed using a peculiar combination of the long-and-short-arm method through its midsection (which was the preferred construction method by the turn-of-the-century), and an older style of framing near the bow and stern. The long-and-short-arm method uses two staggered floors of the same length crossing the keel, so that the long arm of one timber is on the same side of the keel as the short arm of the other (Fig. 2.52). The first futtock on each side of the vessel butt-joins the floor's short arm, while the second futtock butts the long arm. In this way, the futtocks are carried up the vessel's side. The older style of framing uses just one floor, centered over the keel, for one half of the frame pair, with the two first futtocks butt-joined over the keel forming the other half. Second futtocks are attached to either end of the floor and third futtocks are attached to the end of each first futtock. This pattern is repeated up the vessel's side (Fig. 2.52).

Fig. 2.51 *E. C. Waters*' frames. View aft of paired frames with butt joints in the wreck's forward port section. The main and sister keelsons overlay the frames in the upper left. Scale = 1 ft. NPS photo by Brett Seymour

The practice of long-and-short-arm framing was introduced before the American Civil War and became the preferable construction technique by the 1870s (*Record of American and Foreign Shipping* 1879:21). The historical shift to long-and-short-arm frame techniques occurred for several reasons, including availability of material and this framing technique's superior strength:

> The practice of placing two sets of floors across the keel having a long and a short arm on alternate sides is of recent origin, and is consequent upon the great difficulty in obtaining first futtocks of sufficient length, size and crook for ships of the largest classes. It is regarded as a great improvement, inasmuch as it rids the keel of the range of butts with which it was covered under the old system... (Wilson 1873:197).

Specifications for both the "old system" and the long-and-short-arm framing method were included in the *Rules for the Construction of Wooden Vessels*, published annually by the American Shipmasters' Association through at least 1900. Several standard early-20th-century ship construction manuals do not even mention the older framing style (Estep 1918; Curtis 1919; Desmond 1984[1919]) indicating standardization on the long-and-short-arm frame method. No examples of mixing the early and later framing styles in a single vessel were located in either historical or archeological literature.

Forty-eight frame pairs are present in *E. C. Waters*' hull remains (see Fig. 2.50); all floors and futtocks measure 12.7 cm (5 in.) sided and 22.9 cm (9 in.) molded,

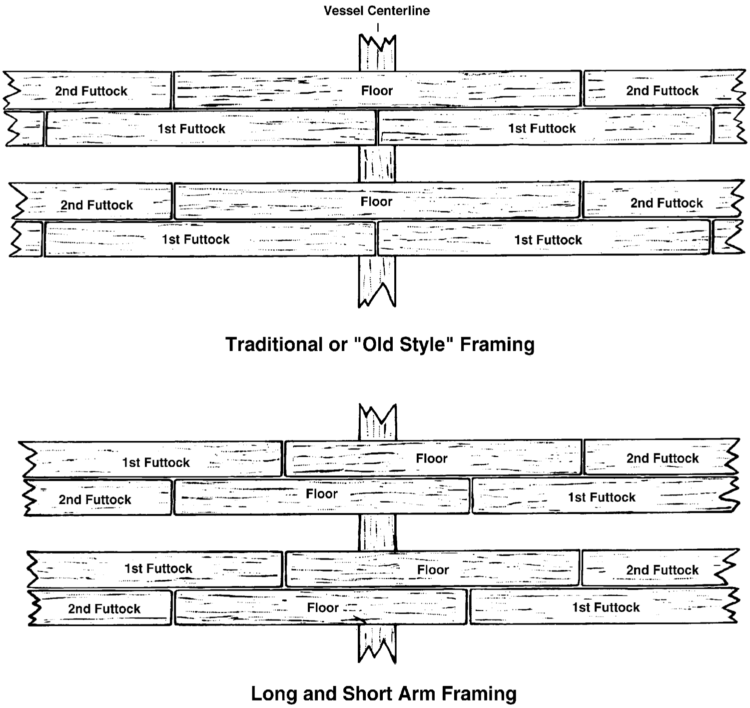

Fig. 2.52 Different styles of framing a wooden vessel. Drawing by Matt Russell

while room and space (distance from the center of one frame pair to the center of the next) is 61 cm (24 in.). As recorded, frame pair no.1 is the first square frame, which crosses the keel perpendicularly. Forward of this square frame were half or cant frames that butted into the deadwood. Half frames remained perpendicular to the keel and became increasingly steep as they formed the pointed ship bow, whereas cant frames rotated forward in a radial pattern. Because no bow framing remains, there is no way to determine if *E. C. Waters*' builders used half or cant frames. The bow filler deadwood exhibits heel notches for the frames and fastener patterns in the outer hull planking indicates several half or cant frames were present. In the stern, two half or cant frames (nos. 47 and 48) notched into the deadwood are still in place on the port side and a notch for a third half or cant frame is present. Fastener patterns on the starboard stern deadwood indicate at least three half or cant frames were used but are no longer present. Frame pairs nos. 1–14, as recorded, were constructed using the older framing style, with a single floor and the port and starboard first futtocks butting under the keelson. Each futtock was fastened horizontally to its mated floor with 1.9 cm (0.75-in.)-diameter fasteners, creating the frame pair. These 14 frame pairs are constructed with the floors forward of the futtocks. *E. C. Waters*' midship section (frame pairs nos. 15–38) is constructed using the long-and-short-arm method, with two staggered floors. Near the stern, frame

pairs nos. 39–46 (the last square frame) revert back to the older style of framing, with a single floor and two first futtocks butted under the keelson, though in these the floors are aft of the futtocks. The last two frame pairs (nos. 47–48), are either half or cant frames, which are mortised into the stern filler deadwood. These frames are perpendicular to the keel, but it was not determined if they are half or cant frames. Only first futtocks are present on *E. C. Waters*' starboard side due to the vessel listing to port when it burned (many futtocks showed evidence of burning on their top ends). There is probably also deterioration from ice, water, wave impact, and vandalism. Several port-side frame pairs' second futtocks are present.

All frame pairs have two limber holes; each hole offset 24.1 cm (9.5 in.) from centerline, allowing for bilge water drainage down the vessel length to the pump wells. The limber holes are roughly rectangular, 3.8 cm (1.5 in.) high, and varying between 7.6 cm (3 in.) and 10.2 cm (4 in.) long. Amidships, beneath the engine mounts, 14 additional floors are present, creating a solid block of athwartship supports that add strength to the vessel's machinery spaces, which bore the combined weight of engines and boilers (Fig. 2.53). Space for two other floors is present in the mount's forward section, but the floors are missing. They may have been purposefully omitted to allow bilge water to pass from one side of the vessel to the other.

Typical of late-19th- and early-20th-century wooden ship construction, *E. C. Waters* was built with multiple keelsons. Keelsons are fore-and-aft centerline timbers extending the vessel's length, located on top of, and fastened through, the floors into the keel, tying the main centerline structures together into a solid unit. *E. C.*

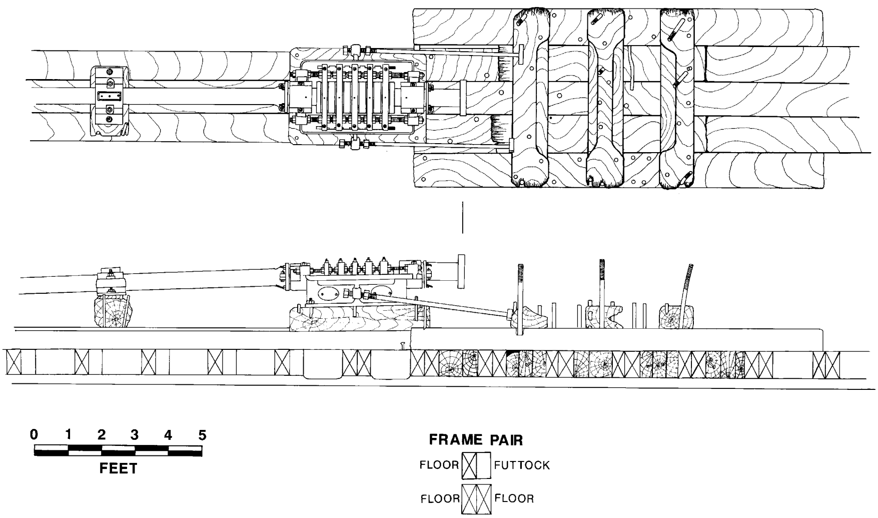

Fig. 2.53 Plan and elevation of engine bed and thrust bearing showing additional frames to support engine weight. Drawing by Jim Bradford

Waters has a main keelson and two sister keelsons, the latter being slightly smaller timbers flanking the main keelson on either side. The forward end of the main keelson is broken and splintered, but is the same length as the keel, suggesting it is almost fully intact. With the exception of the port garboard strake (the outer hull plank closest to the keel), which extends another 0.45 cm (1 ft 6 in.) forward of the keelson and keel, the keel/keelson structure is the forward-most articulated hull structure. A single outer hull plank extends further forward on the port side, but it is loose and not fastened to other timbers. The main keelson extends aft to the sternpost. Its total length is 35.47 m (116 ft 4 in.), and its dimensions are 27.9 cm (11 in.) sided and 25.4 cm (10 in.) molded. Like the keel, a single horizontal scarf is visible on the main keelson, beginning 9.34 m (30 ft 8 in.) aft of its forward-most end. Because the main keelson is flanked on both sides by sister keelsons, no details of this scarf could be observed. It could not be determined if the scarf is angling forward or aft, or what type of scarf it is. Because the keel and both sister keelsons used hook scarfs, however, it is reasonable to expect the builder used this scarf when assembling the main keelson. Given the main keelson length, at least one additional scarf would be expected, probably hidden by the engine bed aft of midship.

E. C. Waters' sister keelsons flank the main keelson, but are slightly shorter. The port sister keelson appears to be complete, its forward end cuts straight 3.30 m (10 ft 1 in.) aft of the main keelson's forward end, just forward of frame pair no.1. In the stern, the port sister keelson ends 4.24 cm (13 ft 11 in.) forward of the main keelson's aft end. This gives the port sister keelson a total length of 28.55 m (92 ft 2 in.); both sister keelsons measure 25.4 cm (10 in.) sided and 20.3 cm (8 in.) molded. The starboard sister keelson's forward end is broken off 2.62 m (8 ft 7 in.) aft of the port sister keelson's forward end. The starboard sister keelson ends in the same place as the port sister, giving it a total length of 25.5 m (83 ft 8 in.). The aft ends of both sister keelsons taper from their full sided dimension of 25.4 cm (10 in.) to 6.4 cm (2.5 in.). The port sister keelson was notched over the frames from the engine bed forward. The notches are 1.27 cm (0.5 in.) deep at the engine bed and get progressively deeper moving forward so they are notched 14.0 cm (5.5 in.) over frame pair no.1. Like the keel and main keelson, each sister keelson has a single visible horizontal hook scarf. The scarfs are offset by several feet, are slightly different lengths, and angle in opposite directions. The port sister keelson scarf begins 10.13 m (32 ft 1.5 in.) aft of the port sister keelson's forward end and is 1.79 m (5 ft 10.5 in.) long horizontally. Its nibs (ends) are 3.8 cm (1.5 in.), the hook is 2.5 cm (1 in.), and it angles up toward the bow. The starboard sister keelson scarf begins 0.41 m (1 ft 4.5 in.) forward of the port sister keelson scarf, is 2.03 m (5 ft 2 in.) long horizontally, has 3.8-cm (1.5-in.) nibs and hook, and angles up towards the stern. Most likely, the slight offset and opposite angles were intentionally designed to increase the centerline structural strength. As with the main keelson, though no other scarfs are visible in either sister keelson, it is likely they are present and probably obscured by the engine bed.

Both outer hull and ceiling planking are present across the *E. C. Waters* site. The vessel's outer hull planking is 7.6 cm (3 in.) thick and 17.8 cm (7 in.) to 27.9 cm (11 in.) wide, depending on where tapering is required by the hull form. The gar-

board strake, the first hull plank butting the keel, is 10.2 cm (4 in.) to 12.7 cm (5 in.) thick. Hull plank lengths vary, but the longest one, a starboard hull plank, is 9.39 m (30 ft 1 in.) long. Hull planking is attached to each frame with 5.1-cm (2-in.) or 8.9-cm (3-in.) square spikes. Ceiling, or interior, planking, 5.1 cm (2 in.) thick and 25.4 cm (10 in.) to 30.5 cm (12 in.) wide, is fastened to each frame with two 1.3-cm (0.5-in.)-diameter round spikes. The starboard limber board (longitudinal planks lying atop the floors) butts the starboard sister keelson and is fastened with spikes, but the port limber board shows no evidence of fasteners. Portions of three bilge strakes (thick planks) are in place on the starboard side. Bilge strakes are thick timbers at the turn of the bilge that add additional longitudinal hull support. On this vessel these strakes are 14.6 cm (5.75 in.) wide x 11.4 cm (4.5 in.) thick, made of multiple lengths joined with 0.91-m (3-ft)-long plain scarfs, and fastened to the frames with 1.9-cm- (0.75-in.) or 2.5-cm (1-in.)-diameter clinch bolts.

In addition to the frames, main keelson and sister keelsons described above, the engine bed or foundation incorporates several other elements (see Figs. 2.50 and 2.53) to strengthen the hull in the machinery spaces. As mentioned above, additional floors were placed between the regularly spaced frames, creating a nearly solid block of timbers under the engine bed. The sided dimensions of these added floors vary between 7.6 cm (3 in.) and 17.8 cm (7 in.). Two timbers measuring 3.81 m (12 ft 6 in.) long, 0.5 m (1 ft 1 in.) sided, and 25.4 cm (10 in.) molded were placed outside each sister keelson to help support the engine. Because the molded dimension of the sister keelsons is 5.1 cm (2 in.) less than the main keelson and the engine bed timbers, a 5.1-cm (2-in.)-thick cover board was fastened over each sister keelson, between the main keelson and the outside timber, making a flush surface to fasten the engine bed frames. The engine bed frames are three transverse timbers fastened to the platform with four to seven 1.9-cm (0.75-in.)-diameter fasteners plus three to four 5.1-cm (2-in.)-diameter threaded bolts that also secured the engine to the three timbers. The bed frames vary in their sided dimensions; the aft timber is sided 0.30 m (1 ft), the middle timber is sided 0.33 m (1 ft 1 in.), and the forward timber is sided 0.41 m (1 ft 4.5 in.). They are all 1.62 m (5 ft 4 in.) long and measure 25.4 cm (10 in.) molded. The timbers are shaped to accept the underside of the engine and allow clearance to the engine crankshaft.

In addition to the intact hull bottom and associated features, there are many scattered hull planks, ceiling planks, bilge stringers, and frames across the lake bottom to the north, east, and southeast of *E. C. Waters*. Several of the scattered timbers show evidence of burning. A complete, systematic survey of areas beyond the main wreck concentration was not conducted.

Propulsion System and Related Features

As noted above, the engine and boiler were salvaged from *E. C. Waters* sometime after its abandonment on Stevenson Island. The boiler was used for many years to heat the Lake Hotel and later sold for scrap; there is no record of what happened to the engine. Historical research did not locate any specifications on engine or

boiler types and sizes, other than a note that the boiler was a Scotch-type marine boiler (Aubrey Haines, 1996, personal communication). Although *E. C. Waters* was built for use in a unique environment, reasonable speculation can be made about the engine and boiler based on parallels from contemporary vessels.

The first compound (two cylinder) reciprocating steam engines were developed during the 1850s and saw widespread service beginning in the 1860s (Gardiner 1993:106). The idea of compounding, in which high pressure steam entered a small, high pressure cylinder and was then recycled to a larger, lower pressure cylinder before being vented or condensed, greatly improved marine steam engine efficiency. This idea was improved upon even further with the triple expansion engine, which added a third cylinder to the basic compound design. Triple expansion engines were first developed during the 1870s and became popular during the 1880s and 1890s; they continued to be built well into the 20th century. At the turn of the century marine steam technology branched into two distinct lines: (1) the reciprocating engine, which reached its pinnacle with the quadruple expansion engine, and (2) the steam turbine, which became more widespread and eventually eclipsed the reciprocating engine (Gardiner 1994:152–154). As with the introduction of the compound engine 50 years earlier and the triple expansion engine 30 years earlier, the most technologically advanced machinery was initially only used in the most profitable trades, such as in Atlantic passenger steamers. It is unlikely *E. C. Waters* carried the most modern steam engine available.

As asserted by Haines (1996, personal communication), there is no question *E. C. Waters* would have been equipped with a cylindrical, or Scotch, boiler. The Scotch boiler was developed during the 1860s and was a great improvement over the firebox boiler, which used many flat surfaces, because it could withstand much greater steam pressures. Scotch boilers were fitted in ships until the mid-20th century (Gardiner 1993:106–107). Although there is no historical documentation on *E. C. Waters*' steam engine, configuration of the bed frames and the size of the thrust bearing indicate either a compound engine (most likely), or a double simple engine, of about 80–100 hp was used in combination with a single Scotch boiler (Ian Ablett, 1999, personal communication).

The only evidence remaining of *E. C. Waters*' engine is the wooden engine bed and the bolts that secured the engine to the bed. The boiler is represented by four iron or steel saddles (Figs. 2.54 and 2.55) that supported the boiler and served to distribute the concentrated weight of the boiler and its water over a larger area through the main keelson and other wooden members of the hull. These four saddles are scattered in the general debris within the vessel's hull, a pattern most likely the result of salvage activity. Each saddle is triangular with one concave side to accept the rounded boiler shell, and is notched on one edge for mounting in the hull. There is no evidence of direct fastening of the boiler to the saddles, indicating metal straps or stays with turnbuckles may have been used to secure the boiler to the vessel.

With the exception of the engine and boiler, the rest of *E. C. Waters*' propulsion system is intact within the wreck (Fig. 2.56). This includes the thrust bearing; propeller shaft with two shaft bearings, the after bulkhead stuffing box and gland, a single shaft coupling, and the stern tube with stuffing box and gland; an

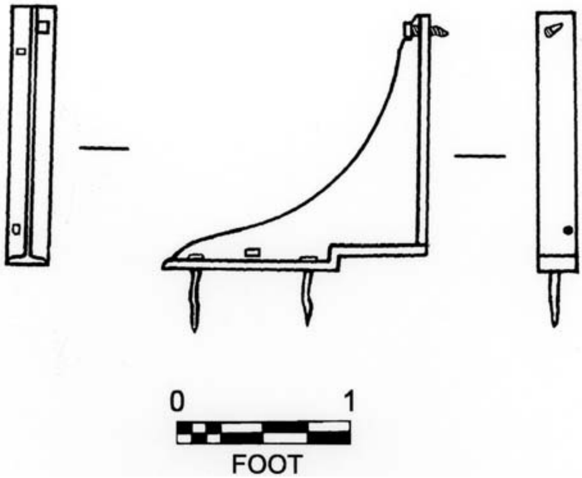

Fig. 2.54 Side and end views of boiler saddle. Drawing by Jim Bradford

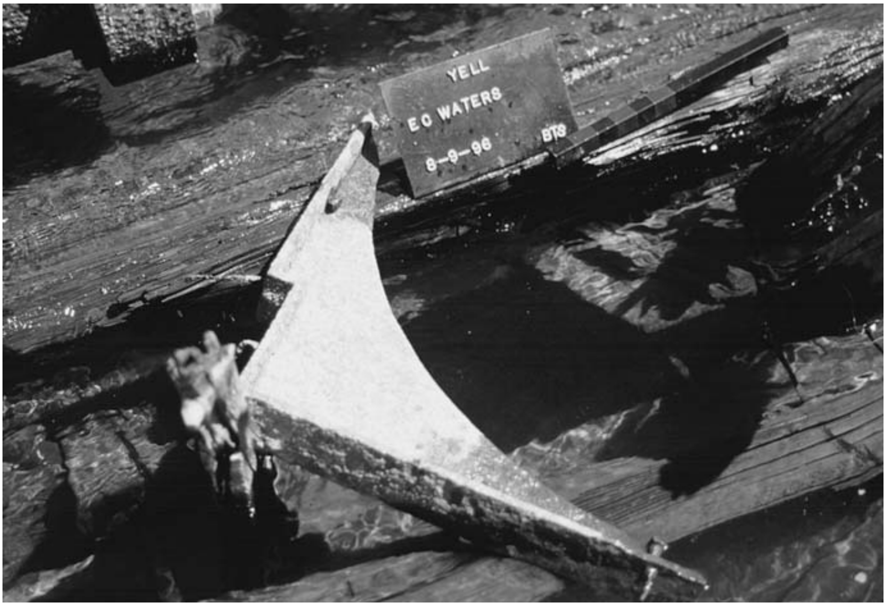

Fig. 2.55 Boiler saddle. Scale = 1 ft. NPS photo by Brett Seymour

adjustable stern bearing assembly; and the propeller. Total length from crankshaft coupling forward of the thrust bearing to the aft end of propeller hub is 11.55 m (37 ft 10.5 in.).

E. C. Waters' thrust bearing (Figs. 2.53 and 2.57) is a multiple-collar block developed during the 1850s and in near-universal use by the later part of the 19th

Fig. 2.56 View west of *E. C. Waters*' propulsion system. The engine bed is in the foreground, the thrust bearing is in the middle foreground and the propeller shaft and the propeller is in the background. NPS photo by John Brooks

century (Gardiner 1993:100). The purpose of the thrust bearing, or thrust block, is "to receive and to transmit to the ship the thrust produced along the line of shafting by the revolution of the screw" (Yeo 1894:83). The thrust bearing is generally positioned near the forward end of the propeller shaft, just aft of the engine, and consists of a block with removable cap. The shaft, at this part of the drive train, is composed of a number of collars while the thrust bearing has a corresponding set of internal collars; in this case, six thrust collars separated by five horseshoe bearings. When the propeller thrust is transferred up the propeller shaft, the shaft collars press upon either the forward or aft faces of the thrust bearing collars, depending on which direction the vessel is going. In either direction, the screw tends to force the shaft slightly forward or aft, but that pressure is taken by the block and, through the strong support on which it is fixed, transferred to the hull.

Fig. 2.57 Starboard side of thrust bearing. NPS photo by Jim Bradford

Adjustment of the thrust block is made with large set screws on either side of the block, while the forward end has a shaft coupling to accept the engine crankshaft. *E. C. Waters*' thrust bearing measures 1.02 m (3 ft 4.5 in.) long × 1.12 m (2 ft 2 in.) wide, and is 0.45 m (1 ft 6 in.) high. It is mounted on a pillow, or plummer, block solidly attached to the main and sister keelsons; the pillow block measures 1.22 m (4 ft) long, 0.88 m (2 ft 10.5 in.) wide, and 25.4 cm (10 in.) high.

E. C. Waters' propeller shaft is intact aft of the thrust bearing (see Fig. 2.56). The forward part of the propeller shaft, or line shaft, is 15.2 cm (6 in.) in diameter and articulates with a 20.3-cm (8-in.)-diameter stern tube in which the aft part of the propeller shaft, or tail shaft, spun. Typically, propeller shafts are hollow, with internal diameter about half the external diameter. The tail shaft within the stern tube is usually larger in diameter than the line shaft, about the same size as the crankshaft attached to the engine. In this case, the tail shaft, where it exits the stern tube and stern post, is 19.1 cm (7.5 in.) in diameter (3.8 cm [1.5 in.] larger than the line shaft) and tapers aft through the propeller hub, or boss.

There are two shaft bearings on *E. C. Waters*' propeller shaft (Figs. 2.58 and 2.59). Their purpose is to support the weight of the shaft and provide lubrication through the oil boxes atop the cap covering. They rest on wooden blocks called pedestals, which are secured to the main keelson.

Located midway between the two shaft bearings, just forward of the shaft coupling, is the after bulkhead stuffing box and gland (Fig. 2.60). It consists of two flanges of two halves each. The upper and lower half of each flange is clamped

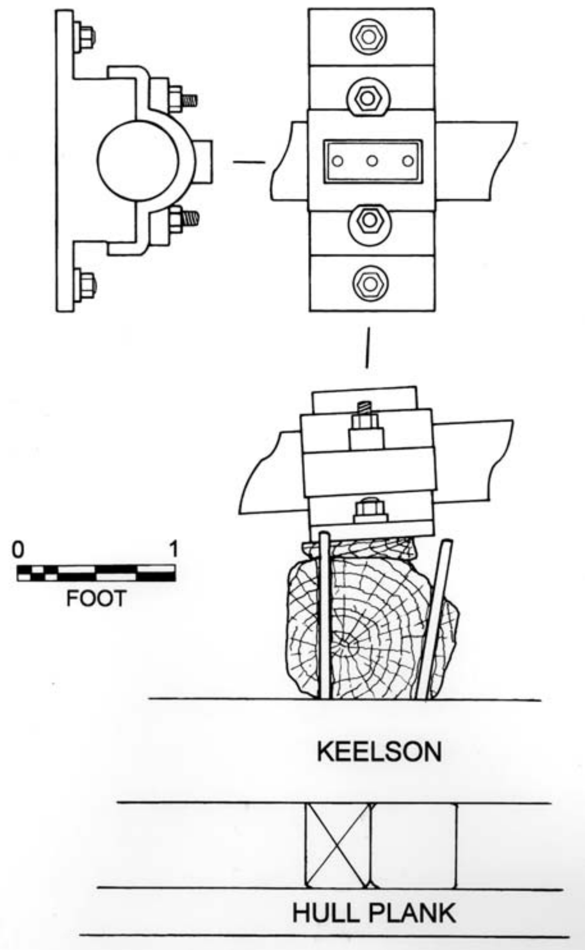

Fig. 2.58 Plan, elevation, and end views of forward propeller shaft bearing. Drawing by Jim Bradford

around the propeller shaft and the two flanges are bolted together, connected by a liner that surrounds the portion of the shaft between the two flanges. This liner, connected to the smaller forward flange, serves as the gland while the larger aft flange serves as the stuffing box, resulting in a watertight connection bolted to the after bulkhead. This feature did not carry the weight of the shaft, but provided a watertight opening through the bulkhead. The bulkhead created an aft compartment that held the shaft coupling and aft shaft bearing.

The shaft coupling (see Fig. 2.60) is a typical design and connected the two propeller shaft sections between the thrust bearing and the propeller. Flanges are forged to the end of each shaft and bolted together with 2.5-cm (1-in.)-diameter

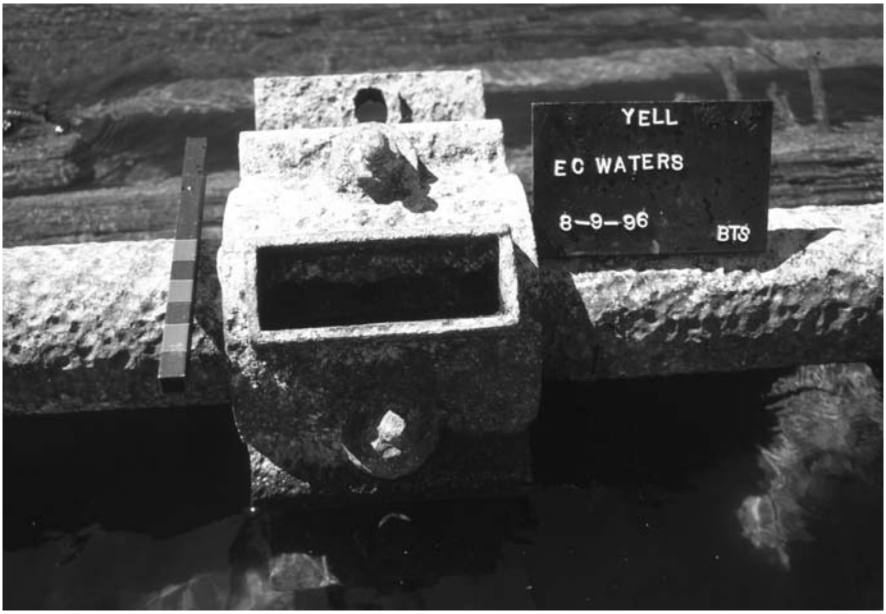

Fig. 2.59 Top view of propeller shaft bearing. Scale = 1 ft. NPS photo by Brett Seymour

Fig. 2.60 View southeast of after bulkhead stuffing box and gland (*left*), and propeller shaft coupling (*right*). NPS photo by Brett Seymour

Fig. 2.61 View southwest of forward end of stern tube stuffing box and gland. Note large bolt on *top* that secured the shaft to the stern deadwood (now missing) through which it passed. Marked section of scale = 6 in. NPS photo by Brett Seymour

bolts. The aft flange has a 25.4-cm (10-in.)-diameter neck, 14 cm (5.5 in.) long, which steps down to the 15.2-cm (6-in.) diameter propeller shaft. Three feet aft of the coupling is the second shaft bearing (see Figs. 2.59 and 2.60).

Three feet aft of the second shaft bearing is the stuffing box and gland on the forward end of the stern tube. The stern tube stuffing box (Fig. 2.61) consists of a flared end of the stern tube with a square flange formerly bolted to deadwood through which the stern tube presumably passed. The gland is a circular flanged tube inserted into the stuffing box and compressed against a fibrous material to make the seal watertight (see Paasch 1890:104, 118; McEwen and Lewis 1953:201).

The stern bearing and bushing assembly is located outboard between the sternpost and propeller, where the propeller shaft exits the sternpost (Figs. 2.62 and 2.63). It consists of a vertical plate bolted to either side of the sternpost and a two-piece iron casting that clamps over the propeller shaft and is bolted to the sternpost. In addition, a wide band, bolted together below the iron casting, wraps around the latter and bolts together above the assembly where a 1.67 m (3 ft 3 in.)-long, threaded, bolt connected through the horn timber. This assembly tied the shaft, sternpost, stern bearing, and horn timber together and provided stability against vibration at the propeller shaft's aft-most end. Similar assemblies have been documented archeologically on *Chisholm* at Isle Royale National Park (Lenihan 1987:224) and *Ottawa*

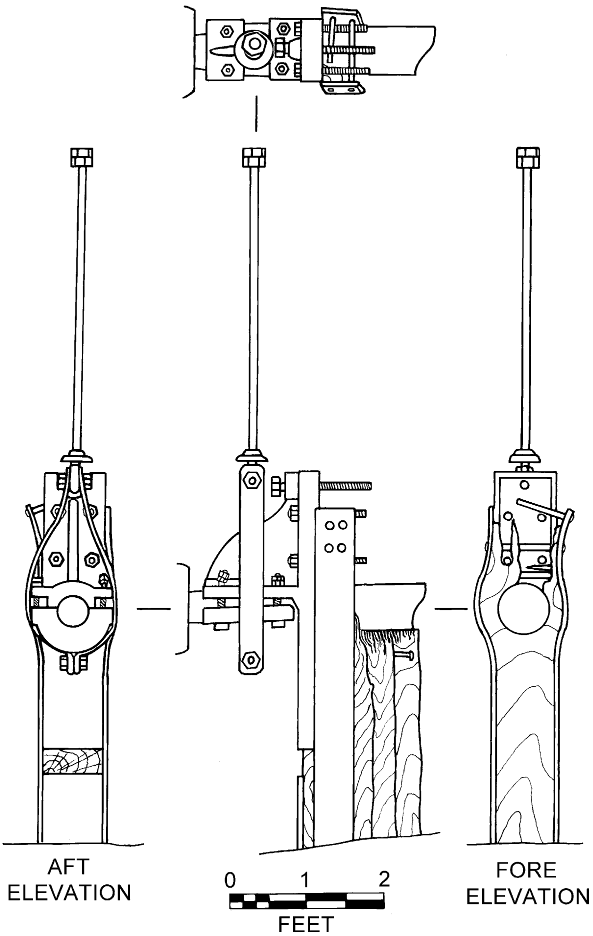

Fig. 2.62 Plan, starboard elevation, fore and aft views of adjustable stern bearing assembly. Drawing by Jim Bradford

in Red Cliff Bay, near Apostle Islands National Lakeshore (Cooper et al. 1991:114), both in Lake Superior.

E. C. Waters' propeller is typical of lake steamers. It is cast iron with four blades, though two blades are broken off about 0.3 m (1 ft) from the hub, or boss (see Figs. 2.63 and 2.64). The two complete blades are elliptical in shape, 1.11 m long × 0.74 m wide (3 ft 8 in. long × 2 ft 5 in. wide) and varying in thickness from base to tip. The boss, 0.36 m (1 ft 2.5 in.) long, is circular in cross-section and has convex sides in profile. It has a diameter of 22.9 cm (9 in.) at each end and is 0.38 m (1 ft 3 in.) in diameter in the middle. The boss and blades are cast as one piece and are keyed to the shaft end and secured with a large hexagonal, keyed nut.

Fig. 2.63 View north, starboard side of adjustable stern bearing assembly (*center*) and propeller (*left*). NPS photo by John Brooks

Disarticulated Machinery and Other Features

Several features associated with *E. C. Waters*' machinery are located within the hull or near the vessel remains. One of the most prominent is a globe valve mounted in the hull bottom on the engine bed's port side (Figs. 2.65–2.67). This valve was the main lake water inlet for supplying water to the boiler and auxiliaries. The valve contains all of the features of an ordinary stop valve as shown in Lyon and Hinds (1915:76–77), but is an angle rather than a straight-through valve. The intake is through a feed water pipe fitted in the wooden block on which the valve is secured.

E. C. Waters' capstan is located 23 m (75 ft) south of the engine bed, buried in the sand in about 0.46 m (1.5 ft) of water (Figs. 2.68 and 2.69). Before 1995, the capstan was located on the beach about 9 m (30 ft) south-southwest of the wreck. During SRC's 1995 visit, the capstan was not located and thought by park rangers

Fig. 2.64 View northeast of propeller. NPS photo by John Brooks

to be missing. A depression on the beach marked the location where park rangers remembered it (Lenihan 1995b:5). During the present site documentation, the capstan was found in its current location, apparently moved by would-be looters in a failed attempt to remove it. The capstan is 0.69 m (2 ft 3 in.) high, 0.4 m (1 ft 4 in.) across the drumhead, and its base is 0.66 m (2 ft 2 in.) in diameter. The base plate, spindle, and drumhead are intact, but the barrel is missing. The capstan is geared, indicating it was probably operated with an auxiliary steam engine.

Seven davits are present within the *E. C. Waters'* wreck (Figs. 2.70 and 2.71). Davits are small derricks of various designs used for hoisting boats, ladders, loads, etc. They are often made of forged ingot steel bent to shape, steel tubing, or built-up welded shapes (Kerchove 1961:199). All seven are 7.6-cm (3-in.)-diameter steel tubing, welded at the bend. A davit collar bolted to the deck secured each base, and each davit was braced below the bend. Figure 2.7 shows three sets of davits holding lifeboats on *E. C. Waters*' port side in about 1906.

Three flat iron or steel brackets are present on the wreck, all loose and not in their original location (see Figs. 2.50 and 2.71). These brackets are made from 1.3-cm (0.5-in.) flat iron or steel in a modified L-shape, with a diagonal brace connecting the arm and leg. A base plate measuring 25.4 cm (10 in.) long, 10.2 cm (4 in.) wide, and 1.3 cm (0.5 in.) thick is attached to the bottom of the leg. A 2.5-cm (1-in.)-diameter tab projects through the plate, which allowed the bracket to swivel on the base plate. A similar tab is also present on the top of the bracket. The plates were secured to the vessel with 7.6-cm (3-in.) lag bolts. Holes drilled through the arms

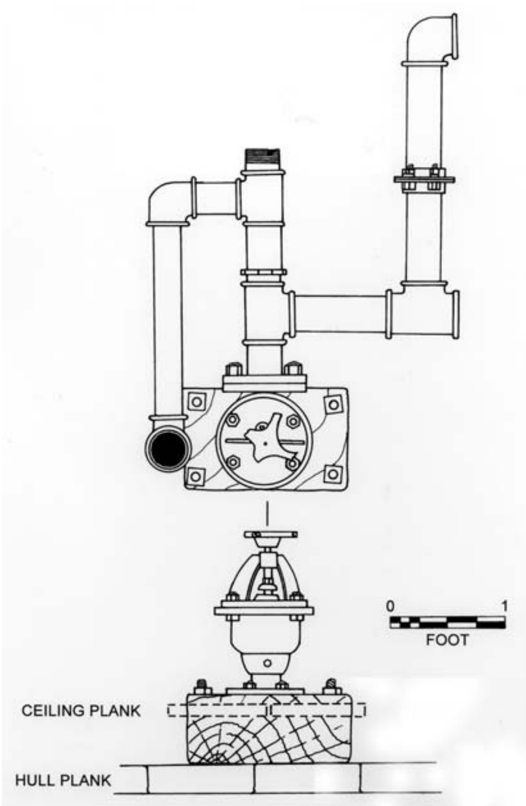

Fig. 2.65 Plan view and aft elevation of the globe valve with intake pipes. Drawing by Jim Bradford

are not identically placed in each piece but are probably evidence of where wooden chocks were attached. These brackets were supports for the lifeboats (see Fig. 2.70) when stowed. They were rigged so as to swing against the cabin and out of the way when the lifeboats were hoisted or lowered.

Various lengths of 2.5-cm (1-in.)-diameter iron or steel rod are scattered across the site. All are bent, and two exhibit particular attributes. One segment, 2.29 m (7.5 ft) long, has the rod curved around to form a symmetrical handle (Fig. 2.72), while the opposite end has a steel plate attached. The plate measures 15.2 cm (6 in.) × 25.4 cm (10 in.) × 0.06 cm (1/16 in.) and, on the opposite side of the attached rod, it has a 3.2-cm (1.25-in.) square nut welded to the plate as reinforcement. Its purpose is unknown but it appears to have been a long handle. The second piece was intentionally bent into a "J" hook at one end and has an "eye" on the other end through which an "eye" from a second segment of rod is joined, giving both pieces an articulated connection. Its function is unknown but it could have served as a connecting rod of some kind.

Fig. 2.66 View aft along port midships showing feed water intake piping (*foreground*) and globe valve (*background*). Scale = 1 ft. NPS photo by Brett Seymour

Fig. 2.67 Close-up view of globe valve. NPS photo by Brett Seymour

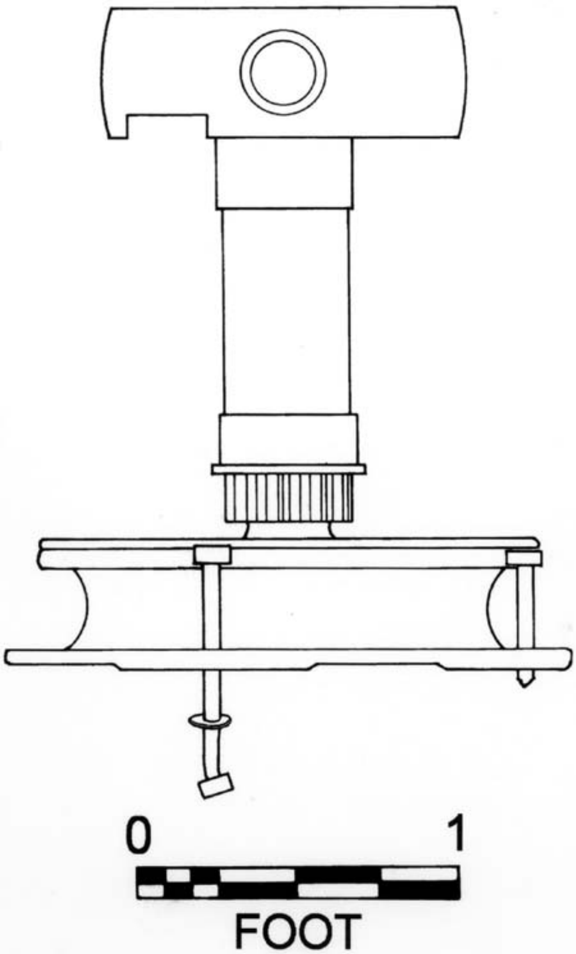

Fig. 2.68 Scale drawing of *E. C. Waters*' capstan. Drawing by Matt Russell

Numerous segments and fragments of iron pipe are scattered throughout the wreck. Lengths vary from a few inches up to 2.44 m (8 ft); most are threaded. Diameters include 1.9 cm (0.75 in.), 2.5 cm (1 in.), 3.2 cm (1.5 in.), 5.1 cm (2 in.), 6.4 cm (2.5 in.), 7.0 cm (2.75 in.), 7.6 cm (3 in.), 8.9 cm (3.5 in.), and 15.2 cm (6 in.). Many examples of pipe tees, elbows, and plugs are also scattered around the hull. Many pipes walls are corroded through. Most were probably part of the main and auxiliary steam systems and several are still attached to the globe valve described above.

Thirteen small iron or steel plates are located within the wreck, most concentrated in two clusters just forward of the engine bed. Each plate (Fig. 2.73a) measures 0.97 m (3 ft 2.5 in.) long × 27.9 cm (11 in.) wide × 0.6 cm (0.25 in.) thick. Two 6.4-cm (2.5-in.) holes are present on each plate's centerline near each end and

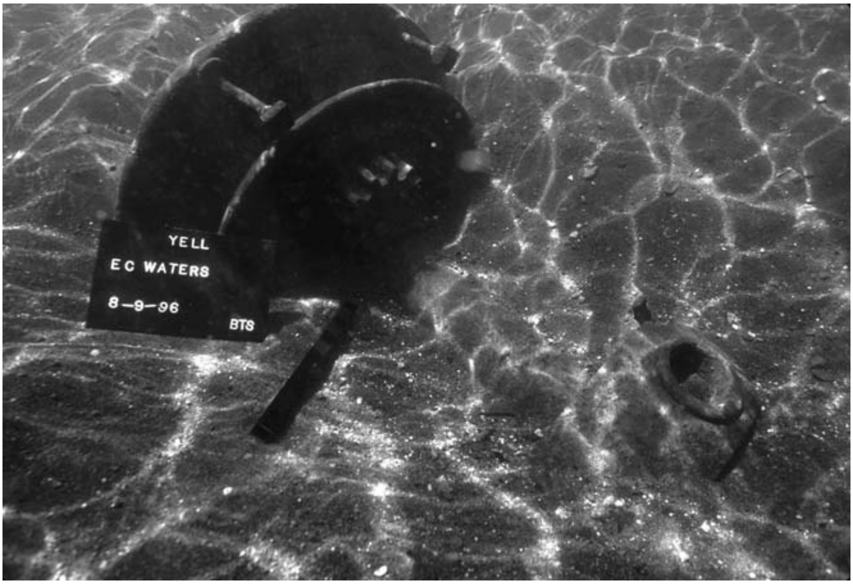

Fig. 2.69 Partially buried capstan. Scale = 1 ft. NPS photo by Brett Seymour

were used to either fasten the plate down or lift it. The tops are patterned with uniform squares raised from the plate's surface, two squares per inch. These provided traction on the plate's surface. On the underside, each plate has eight 5.1-cm (2-in.)-long, 0.6-cm (0.25-in.)-wide, 1.3-cm (0.5-in.)-thick tabs, four along each side. These tabs may have served as small legs upon which the plates rested or, more likely, secured the plates from movement once installed. These plates were probably flooring around the engine or boiler.

A single large iron or steel sheet is present forward of the engine bed (see Fig. 2.50), although it is not secured in its original location. The sheet is 2.27 m (7 ft 5.5 in.) long, 0.61 m (2 ft) wide and 0.6 cm (0.25 in.) thick. It is notched on one end and three 0.6-cm (0.25-in.) square holes are present along one end, each with a 2.5-cm (1-in.)-long square nail in place. Two 1.3-cm (0.5-in.) holes are present along each side, with an additional 0.6-cm (0.25-in.)-diameter hole on one side, while the fourth side has a crudely cut 3.2-cm (1.5-in.)-diameter hole near the edge with a 2.5-cm (1-in.)-diameter bent steel rod through it. Function is unknown, but it may have been a heat shield on top of the keelsons, below the boiler.

A single, uniquely shaped, iron or steel brace is also located within the wreckage (Fig. 2.73b). It is roughly V-shaped and twisted to accommodate whatever it secured with 0.6-cm (0.25-in.) × 10.2-cm (4-in.) carriage bolts. It is very similar to the boat davit braces (Fig. 2.73c) but is shaped to fit a wooden board rather than a metal pole. Its association is unknown.

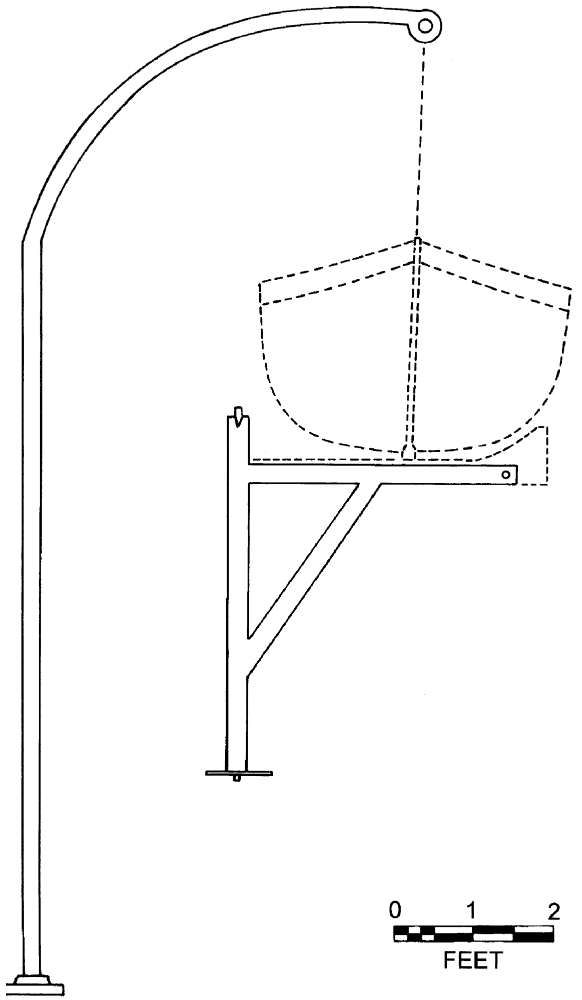

Fig. 2.70 Scale drawing of life boat davit and support bracket showing their relative positions

Three examples of iron or steel strapping are present; one at the wreck's stern (Fig. 2.74), a second in shallow water about 30.5 m (100 ft) south of the wreck's bow, and the third on shore about 60 cm (200 ft) southeast of the wreck. All are at least 15.2 cm (6 in.) wide and 0.6 cm (0.25 in.) thick, and partially buried in the sand. The one on shore is square in shape, the one near the stern is about 3.7 m (12 ft) long and L-shaped, while the third is long with one end curved into a round. None are in their original location, and their functions are unknown.

Fig. 2.71 Davit (*left*) and support bracket (*right*) within *E. C. Waters*' wreckage. NPS photo by Brett Seymour

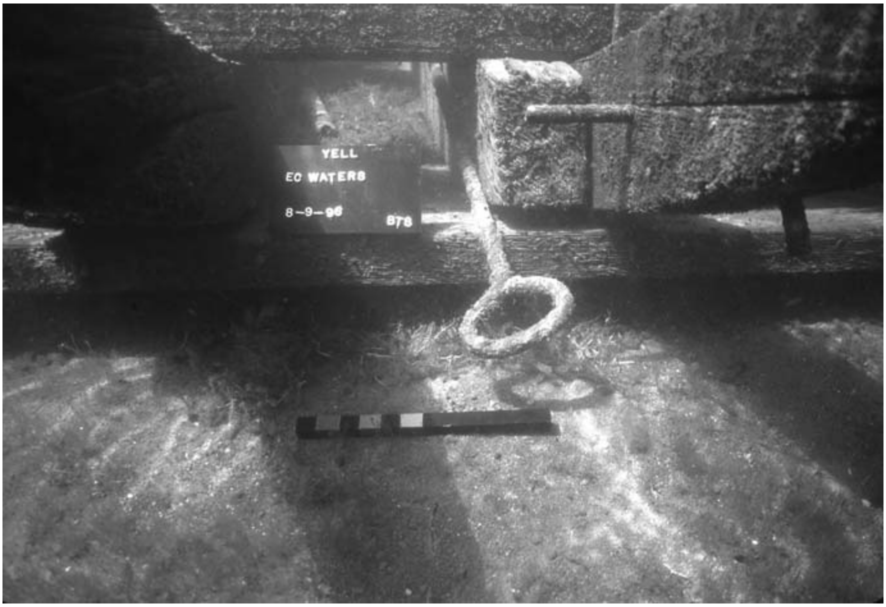

Fig. 2.72 Metal rod handle wedged between frames on the port side turn of the bilge. Scale = 1 ft. NPS photo by Brett Seymour

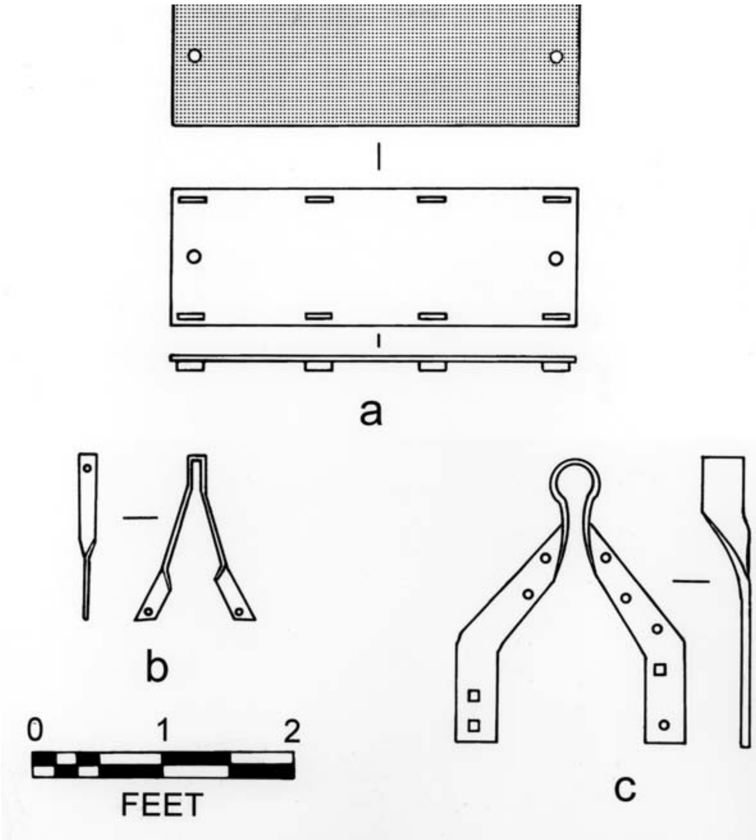

Fig. 2.73 (**a–c**) Plan and profile views of flat metal plate (a) "V"-shaped brace (b) and boat davit brace (c). Drawing by Jim Bradford

Many small, portable artifacts are located between *E. C. Waters*' frames, including two pieces of 2.5-cm (1-in.)-thick glass (Fig. 2.75). Small slivers of windowpane glass were also noted on the site, probably from the cabin windows. Three small pieces of hardware were also observed. One is a small cabinet door hinge, one is a brass keyhole plate, and the third is part of a door lock jamb. All would have been located in *E. C. Waters*' pilothouse or cabins. These are only the most noteworthy of the many artifacts on the site.

A variety of fasteners is located across the wreck. These fasteners range from small wire nails to hull spikes and clinch pins. Many of the items described above were fastened to the vessel with common nails, screws, and bolts. Numerous nails are present along the keelsons and appear to mark locations where blocks of wood supports were, or are, located. These are common nails varying in size from 2d to 10d. Equipment bases, brackets and braces were fastened with 2.5-cm (1-in.) square nails and various sized carriage bolts and lag screws. Smaller wooden members

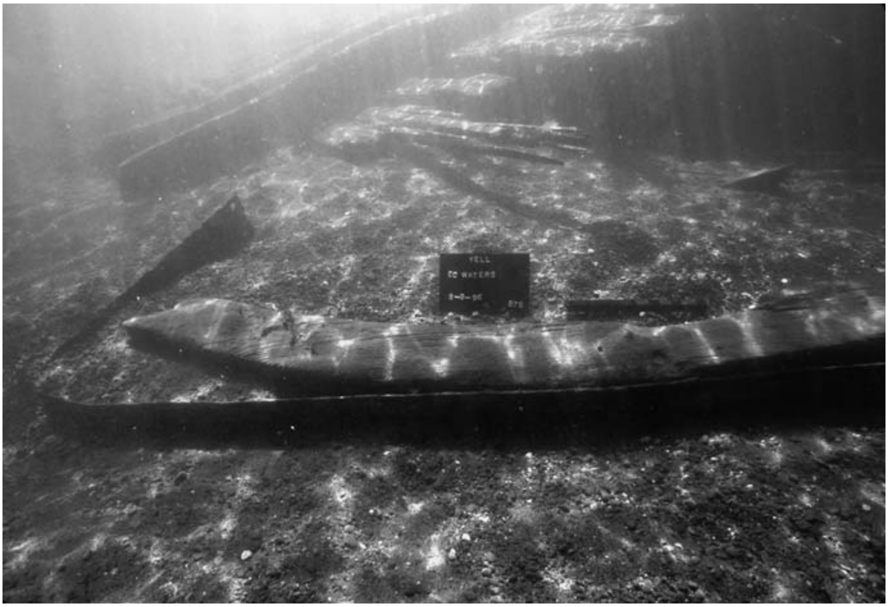

Fig. 2.74 Iron or steel strap near *E. C. Waters*' stern. Scale = 1 ft. NPS photo by Brett Seymour

Fig. 2.75 Thick glass fragments between *E. C. Waters*' frames. Scale = 1 ft. NPS photo by Brett Seymour

and frame pairs were fastened with 1.9-cm (0.75-in.) pins, while hull planking was fastened with 1.3-cm (0.5-in.) square spikes. The larger wooden elements of the vessel were fastened with 1.9-cm (0.75-in.) and 2.5-cm (1-in.)-diameter fasteners, some threaded to receive nuts to secure metal components.

Analysis and Discussion

The *E. C. Waters* site is unique not only in Yellowstone, but to the entire National Park System. No other high-altitude lake passenger steamer as large as *E. C. Waters* is known to exist in any other park waters. Smaller passenger vessels still exist, in use and as archeological sites, in Glacier National Park (see Russell 1997) and possibly in other mountain parks, as well. By studying the *E. C. Waters'* site, archeologists have a unique opportunity to learn about maritime aspects of tourist economy-development in the world's first national park.

The *E. C. Waters* site shows clears indications of burning more than 70 years ago. The vessel burned to the waterline on its port side and below the waterline on the starboard side as it listed to port. Despite this, the hull bottom, arguably the most diagnostic portion of a ship's hull, is in relatively good condition thanks to the cold, freshwater of Yellowstone Lake. Hull construction is mostly typical of wooden-hulled steamer construction. Scantlings, scarfs, machinery, and general construction style is comparable to contemporary Great Lakes construction rules and practices. Although it is unlikely the vessel was insured or classified by a marine underwriter, it would likely have met all the requirements of published rules and regulations. Even the odd stern bearing arrangement described above has corollaries in the Great Lakes, as evidenced by shipwrecks in Isle Royale and the Apostle Islands. Many small details, such as the keel and keelson horizontal hook scarfs, indicate a seaworthy vessel constructed by a competent shipbuilder rather than a local carpenter without shipbuilding experience. At 2,438 m (8,000 ft) above sea level in the Wyoming mountains, we expected to find more evidence of expediency or vernacular building techniques, neither of which was the case.

E. C. Waters' mixed-style framing pattern, however, is an anomaly; no analogous examples were located in the historical or archeological literature. The obvious question, then, is why did the builders use this framing pattern? By the turn of the century it had been clearly demonstrated that the long-and-short-arm framing method provided greater hull strength than the older framing style because it eliminated butted first futtocks over the keel. Yet *E. C. Waters*' builders created an unusual hybrid of the two framing styles. We can dismiss a functional explanation; mixing framing styles is not a superior way to build a ship's hull. So we turn to a cultural explanation. This mix of frame patterns could indicate multiple builders, one who directed the project during midship construction, and a different one involved in bow and stern framing. Another possibility is that bow and stern timbers were reused from some other shipbuilding project and brought to Yellowstone Lake prefabricated for use in *E. C. Waters*. The unusual framing pattern, then, may reflect recycling and reuse behavior. Lack of unused fastener holes, however, supports multiple builders rather than reuse.

Salvage activity on *E. C. Waters* was also similar to typical salvage behavior seen in the Great Lakes, but differed in one notable way: although the engine and boiler were recycled and reused, the vessel's thrust bearing and propeller were left in place on the wreck. Typically, in coastal and Great Lake environments, if the engines and boilers were accessible enough to be salvaged, then other high-cost, reusable items such as the thrust bearing and propeller were also removed. This is the case on several sites documented in Lake Superior, for example the *Monarch* wreck at Isle Royale National Park (Murphy et al. 1987:264), where engine, boiler, thrust bearing, and propeller were recycled. When the engine and boilers were inaccessible, such as on Isle Royale's *Glenlyon*, then the thrust bearing and propeller were also left in place. In the case of *Glenlyon*, deep water prevented salvage of any reusable equipment. On *E. C. Waters*, however, even though the engine and boilers were removed and the thrust bearing and propeller were easily accessible, they were not salvaged. This likely reflects the unique environment in which the steamer operated. The engine and boiler were easily put to non-maritime use: the boiler was used to heat the Lake Hotel, and although it is unknown where the engine was used, it could easily have been used locally, for example in a lumber mill. The thrust bearing and propeller, on the other hand, had no use other than on another screw steamer. In the Great Lakes or coastal locations, objects like the thrust bearing and propeller could easily be sold for reuse, or possibly for scrap. This was not the case in Yellowstone. With the ascendancy of automobiles after World War I, the commercial viability of another steamboat was marginal at best, and the cost of transporting the salvaged items to a different lake for reuse in another large steamer would likely have been prohibitive. There was no local market for scrap, and transportation costs would have likely exceeded potential returns. Tied into the larger economic processes of industrialization, there was very little incentive to reuse and recycle marine-specific materials from *E. C. Waters*.

The *E. C. Waters* site, as representative of the Yellowstone Lake Maritime System, displays both the expected homogeneity and variability in construction techniques and salvage activity as compared to contemporary Great Lakes maritime systems. *E. C. Waters*' construction and salvage provide insight into aspects of typical maritime behavior that may be unique to the Yellowstone Lake's maritime system. Differences may be accounted for by a variety of cultural and environmental influences, including the isolated, high-mountain setting.

Ultimately, the *E. C. Waters* failed (in that it never carried paying passengers) not because of any technological deficiency, but because of historical contingency; that is, the circumstances for which it was built changed. The passenger trade on Yellowstone Lake was taken over by a smaller steamer, *Jean D*, and it was never economically viable to put the much larger *E. C. Waters* into service. *E. C. Waters* sat idle long enough on Stevenson Island that not only did it outlive its usefulness as a passenger steamer (the passenger trade came to an end after World War I as automobiles came into ascendancy), but even some of its most expensive and valuable elements were not worth recovering. This change is a hallmark of tourism as a dynamic, capital-intensive enterprise in which infrastructural changes occur rapidly to meet the needs of an ever-changing clientele – the tourist. Tourism is a highly

complex phenomenon composed of many disparate but interdependent elements, each of which can adversely affect the others economically with its poor performance (Hunt 1994c:26). Nash (1981:462–463) terms the multiplicity of interdependent elements a "touristic system." He writes that "what its characteristics are and whether it will change or not will be dependent not only on developments in the partner societies, but also on suprasocietal happenings" (Nash 1981:463). The elements of a tourist industry "must be understood by reference not only to the touristic system, but also to outside forces that sustain and shape it" (Nash 1981:463). In the case of *E. C. Waters*, the steamer was marginalized by the changing nature of the tourist trade as dictated by larger forces in society.

Documentation of *E. C. Waters* and other sites in Yellowstone Lake give researchers a tangible link to Yellowstone's turn-of-the-century tourist trade. Few maritime material remains are left in the park representing the new century's burgeoning tourist economy, and several of those, such as the West Thumb docks, the Lake Hotel docks, the small boats off the Lake Hotel, and *E. C. Waters*, are submerged in Yellowstone Lake. Analysis of these important archeological remains provides insight into aspects of these commercial enterprises not recorded in the historical record. Baseline documentation of archeological resources allows researchers to pose particular questions relating to Yellowstone Lake's maritime history and creates the opportunity to study a little-documented facet of Yellowstone's economic development as a tourist destination.

Conclusions

Investigation into the unique remains of Yellowstone Lake's maritime system has clarified many aspects of this subset of the park's tourist system. Because of the intensive nature of the fieldwork that led to this chapter, park archival research was not as comprehensive as we would have liked. We were not able to completely trace many of the intriguing leads located within park archives, photographs, and library. Other complementary regional records and those in Aubrey Haines' possession were not examined. However, researchers were able to obtain sufficient information to describe cultural resources located during fieldwork and evaluate their potential significance.

Some aspects of our study produced negative evidence. For example, we did not locate reported stagecoach parts near Pumice Point or submerged features associated with the Little Thumb Creek facilities. Limited material evidence in some areas, such as the Lake Hotel dock area and West Thumb Geyser Basin, suggests a very efficient effort at removing buildings, docks, etc., from those locales. Additional archival research and oral history collection with former and current park employees would likely augment the history and observations presented in this chapter.

Confirmation of the lake steamer *Zillah*'s fate is one of the most intriguing questions. Data from the remote sensing survey suggest *Zillah* is not on the lake bottom, at least in the primary area identified by local lore. Additional historical research is

necessary before continuing a search for its remains. Little is known about the lake vessel *Jean D*, and more research is required here, too. More is known about *E. C. Waters*, a vessel that may have never carried a paying passenger on the lake.

The West Thumb Geyser Basin dock remains are unquestionably an archeological site that has significant association with park development, particularly regarding lake transportation and tourism. These remains, one of the earliest lake docks, represent a lakeshore tourist destination second only to the Lake Hotel dock. The Lake Hotel docks present very little archeological evidence of its past. The West Thumb Geyser Basin dock remains should be preserved and protected, and they may offer an interpretive potential for both land and diving visitors.

E. C. Waters' remains, along with the Lake boathouse, are the most obvious surviving cultural resources associated with Yellowstone Lake boating history. The wreckage is a destination for present-day lake boat tours, as well as pleasure boaters and fishermen. Site documentation resulting from this study can serve interpretive purposes and as a baseline against which evaluation of future impact can be measured. Interpretation and monitoring of this site is warranted and recommended.

Documentation of *E. C. Waters* and other elements of the Yellowstone Lake Maritime System and their interpretation in a systemic context resulted in a better understanding of the sites and the system of which they were part than if they had been examined as isolated sites. A methodological approach that encompassed a wider context allows a focus on the wreck and other elements of the maritime infrastructure as part of an integrated whole. These sites are directly linked to the larger capitalist world-system through their connection to the Northern Pacific Railroad as well as changing sociological and technological dynamics each of which directly affected the archeological record in and around Yellowstone Lake. Few maritime material remains are left in the park representing the Lake-based tourist economy, but analysis of these archeological remains provides insight into aspects of these commercial enterprises not recorded in the historical record. Baseline documentation of Yellowstone Lake maritime archeological resources allows researchers to pose particular questions relating to Yellowstone Lake's maritime history and the maritime system that developed there, and creates the opportunity to study a little-documented facet of Yellowstone National Park's economic development as a tourist destination. *E. C. Waters* and the Yellowstone Lake Maritime System reflects the economic importance of tourism and its power to transform the landscape, creating an inland maritime system at an elevation of 2,438 m (8,000 ft) above sea level, hundreds of miles from the nearest navigable waterway.